ORIGINAL ARTICLE

Use and Perceived Need of Physical Therapy Following Severe Lower-Extremity Trauma

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ABSTRACT. Castillo RC, MacKenzie EJ, Webb LX, Bosse MJ, Avery J, and the LEAP Study Group. Use and perceived need of physical therapy following severe lower-extremity trauma. Arch Phys Med Rehabil 2005;86:1722-8.

Objective: To examine the utilization of physical therapy (PT), the level of perceived need for PT, and the proportion of patients with perceived need receiving no PT in a cohort of severe lower-extremity trauma patients treated at level I trauma centers.

Design: Longitudinal, observational study of severe lower-extremity trauma patients. Patients were interviewed by a research coordinator and examined by an orthopedic surgeon and a physical therapist during initial admission, and at 3, 6, 12, and 24 months postdischarge.

Setting: Eight level I trauma centers.

Participants: Of 601 patients age 18 to 65 enrolled in the parent study over a 40-month period, 550 with unilateral study injuries and followed up at least once over the 2-year study period were included in this analysis.

Interventions: Not applicable.

Main Outcome Measure: Patient reported number of PT visits at each follow-up time point, inpatient rehabilitation admissions, and their perceived need for PT. Perceived need for PT was also assessed by an orthopedic surgeon and a physical therapist. Overall, concordance between physician, physical therapist, and patient's assessment of need for PT was low, with κ statistics ranging between .12 and .41.

Results: Amputation and reconstruction patients used comparable amounts of PT services. Regardless of the criteria used to evaluate need, the proportion of patients with perceived need for PT receiving no PT services increased over the course of the follow-up, from 23% to 46% at first follow-up to over 68% by 2 years. Factors associated with increased risk for having a perceived need but receiving no therapy included lack of private insurance, pain, lower levels of education, lower fitness levels at time of injury, being a smoker, and having severe muscle injury.

Conclusions: The results suggest a significant proportion of patients in the severe lower-extremity trauma population have perceived need for PT, yet receive no PT services.

Key Words: Leg; Physical therapy techniques; Rehabilitation.

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VERY LITTLE IS KNOWN about the use of physical therapy (PT) services following lower-extremity trauma. Even less in known about the extent of unmet need for PT services in this population. Most of the research related to PT use posttrauma has focused on the burn, spinal cord, traumatic brain injury, and elderly hip fracture populations. In these populations, access to health insurance and sociodemographic factors have been shown to play a role in the use of both PT and vocational rehabilitation services.[1-4] The most comprehensive study of PT use in the limb fracture population was published in 1979 by Garraway et al.[5] In this study, 17% of limb fracture patients received PT or occupational therapy, with 96% of these visits occurring on an inpatient basis. Two reports, 1 in the pediatric head-injury population[6] and 1 in the upper-extremity trauma population,[7] show a significant amount of unmet need for rehabilitation services posttrauma. These reports also show differences in access to these services, based not only on injury severity but also on insurance status and financial resources.

The current study examines the utilization of PT in a cohort of 569 severe unilateral lower-extremity trauma patients who were treated by reconstruction or amputation at 1 of 8 participating level I trauma centers and followed up for 2 years.[8,9] The analysis had 3 goals: (1) to characterize the use of PT in this population; (2) to measure and compare the need for PT services, as assessed by the patient, a physical therapist, and an orthopedic surgeon; and (3) to study the factors associated with having an unmet need for PT services. We hypothesized that patients would report greater need for PT services than physical therapists and orthopedic surgeons. We also hypothesized that financial and social resources, specifically income, insurance status, and availability of social support would be strong predictors of unmet need. Finally, because reconstruction patients have previously been shown to have a longer recovery period than amputation patients,[9] we hypothesized that they would also utilize more PT services.

METHODS

Study Population

The present study used data collected as part of a larger, multicenter study, the Lower Extremity Assessment Project (LEAP). The LEAP study was designed to compare clinical and functional outcomes following amputation versus reconstruction among patients sustaining severe lower-extremity trauma, and was conducted at 8 level I trauma centers (Carolinas Medical Center, Cleveland MetroHealth Medical Center, Harborview Medical Center, North Carolina Baptist Hospital, R Adams Cowley Shock Trauma Center, Tampa General Hos-

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pital, University of Texas Southwestern Medical Center, Vanderbilt University Medical Center). A total of 601 eligible patients between the ages of 16 and 69 and admitted for treatment of severe lower-extremity trauma below the distal femur were recruited into the LEAP study. Inclusion and exclusion criteria for entry into the study have been reported earlier.[8] These criteria were established to identify patients at risk of amputation who did not have significant injuries to the central nervous system or a preexisting mental health problem that would compromise recovery. The LEAP study has been described in greater detail elsewhere.[8,9] The current analysis focuses on 569 patients with unilateral study injuries, of whom 19 were completely lost to follow-up and thus excluded. Of the remaining 550 patients, 165 were treated by amputation and 385 were treated by reconstruction (including 202 patients with tibia fractures, 68 with vascular injuries and knee disarticulations, 115 with foot/ankle/pilon fractures). Follow-up rates at 3, 6, 12, and 24 months were 92%, 92%, 90%, and 82%, respectively. Because this analysis relies on comparisons across time intervals, patients could only be included if they were followed up at 2 consecutive time points. Of the 550 eligible patients, 481 (87.5%) were available at the 3- to 6-month interval, 483 (87.8%) were available at the 6- to 12-month interval, and 453 (82.4%) were available at the 12- to 24-month interval. Patients lost to follow-up were more likely to be nonwhite and less educated than followed up patients.[8]

Procedures

We enrolled patients in the study over a 40-month period (March 1994–June 1997) and followed up with them prospectively at 3, 6, 12, and 24 months postinjury. The research team at each site included the treating orthopedic surgeon, a site coordinator, and a physical therapist (who was not necessarily involved in the care of the patient beyond study-related activities). During the initial hospitalization, data were collected to classify the extent of injury to the lower extremity and other body systems. In addition, detailed information about the treatment of the lower extremity was recorded prospectively and general characteristics about the hospital stay were abstracted from the medical record. These data were either directly collected by the treating orthopedic surgeon or abstracted from the medical records by the site coordinator. Prior to discharge, a physical therapist and the treating orthopedic surgeon from the hospital independently evaluated each patient, and the patient was also interviewed by the study coordinator. At each follow-up, each patient was brought back to the hospital and asked to participate in: (1) an orthopedic evaluation conducted by the treating orthopedic surgeon to ascertain the occurrence of complications, status of the involved limb(s) and subjective assessment of its cosmetic appearance, clinical recovery, and functional recovery; (2) an evaluation by a physical therapist to ascertain the extent of physical impairment, pain, and functional limitation; and (3) an interview conducted by the site coordinator to measure the patient's perception of his/her functional status and overall sense of well-being, use of services and perceived need for additional services. This study was reviewed and approved by the institutional review boards of each participating institution. Informed consent was obtained from each patient participating in the study.

Characterizing Patients and Their Injuries

We collected extensive data about the patient's environment, demographics, and health habits preinjury, including: income level, years of education, age, existing chronic conditions, race, gender, alcohol and drug consumption, health insurance, personality type, health status at baseline (including ability to climb stairs, run, walk, and exercise), previous lower-extremity injuries, availability of social support, and self-efficacy for return to work.[8] All lower-extremity injuries were prospectively classified between the time of admission and soft tissue coverage, using standard classification criteria from limb salvage indices proposed in the literature. For the analysis, we summarized injuries according to (1) type and extent of bony injury using the Arbeitsgemeinschaft für Osteosynthesefragen (AO) classification of tibia fractures,[10] the Hannover fracture scale,[11] the limb salvage index,[12] and the predictive salvage index[13]; (2) the extent of skin, neurovascular, muscle, and tendon injury using the AO classification of soft tissue injury of tibia, the Hannover fracture scale, the limb salvage index, and the predictive salvage index; (3) plantar sensation and shock as defined by the Mangled Extremity Severity Score[14]; and (4) overall tibia fracture assessment using the Gustilo classification.[15] Associated injuries were classified using the Abbreviated Injury Scale (AIS)[16] and the Injury Severity Scale (ISS) score[17]; 2 scores denoting the maximum AIS severity of contralateral and ipsilateral injuries were also computed. Postacute pain levels were measured at the baseline interview and at 3 months after initial hospital discharge, using a visual analog scale (VAS) recording pain at the time of the interview.

Outcome Measures

Use of PT services. At 3, 6, 12, and 24 months postinjury, patients were asked to estimate the number of outpatient PT visits they had received since the previous follow-up. For patients who received inpatient rehabilitation in a rehabilitation hospital, data were only available regarding their length of stay (LOS). For the purposes of this analysis, we estimated that these patients participated in 2 PT visits a week of inpatient stay. The overall conclusions of this article were not changed by excluding inpatient visits from the analyses or by estimating that patients participated in 1 PT visit per day of inpatient stay.

Unmet need for PT. For the purposes of assessing unmet need for PT, we divided our follow-up into 3 segments: 3 to 6 months, 6 to 12 months, and 12 to 24 months. Unmet need for PT was assessed from 3 perspectives. First, patients who reported needing PT, but who reported receiving no services at 6, 12, and 24 months, were classified as having unmet need as assessed by the patient for the preceding period. As follow-up questions, patients who had not received PT were asked for the reasons preventing them from obtaining these services, while patients receiving PT were asked if they were satisfied with the amount of PT received. Second, the orthopedic surgeon evaluating the patient as part of the follow-up was asked whether they felt the patient would benefit from PT between the present and the next follow-up visit. Finally, a physical therapist conducting a separate evaluation was asked whether the patient would need PT between the present and the next follow-up visit. No specific criteria were provided to either the surgeons or the physical therapists by which to evaluate PT need. Patients who were classified by the 2 health professionals as needing PT services over a given time period and who reported receiving no PT at the end of that time period (next follow-up time point) were classified as having unmet need as evaluated by the orthopedic surgeon or physical therapist for that follow-up segment.

Data Analysis

Statistical differences at the bivariate level were evaluated using standard tests (*t* test for continuous variables, chi-square for dichotomous variables, analysis of variance [ANOVA] for

categoric variables). Concordance between measures of need was assessed using κ statistics. Three separate multivariate longitudinal logistic regression models were developed to evaluate the factors influencing each of the 3 measures of unmet need for PT services as assessed by the patient, the physical therapist, and the orthopedic surgeon. We present all 3 models in the results section. In these analyses, the dependent variable was whether the patient had unmet need, and the population was limited to those who were classified as needing therapy. Before proceeding with estimation of the regression models, exploratory techniques were used to examine the relationship between unmet need and each of the hypothesized covariates. We performed final model estimation using generalized estimating equations regression techniques with an exchangeable correlation structure.[18] We evaluated all of the patient, treatment and injury characteristics described above in the model, including investigation of possible interaction terms. Only predictors significant at the P less than .1 level were kept in the final regression models.

RESULTS

Patient Demographics

Demographics for this population have been described in detail elsewhere.[8] We show selected demographic characteristics of this population in table 1. Patients ranged in age at time of admission from 17 to 69 years, with a mean age of 35.6±12.4 years. Most patients were male (77%), white (72%), and between the ages of 20 and 45 years (71%). Socioeconomic status indicators for this cohort were lower than for the general population. Seventy percent graduated from high school (vs 86% nationally; $P<.05$). One fourth lived in households with incomes below the federal poverty line, compared with 16% nationally ($P<.05$). The percentage with no health insurance (38%) was also higher than in the general population (20%; $P<.05$). The percentage of heavy drinkers was over 2 times higher than reported nationally ($P<.01$).

Table 1: Demographic Characteristics of Study Population

Characteristics	N	%
Total study population	550	100.0
Smoking status at baseline		
Never smoked	189	34.4
Quit smoking	160	29.1
Current smoker	200	36.4
Preinjury fitness level		
Low (able to run <1 mile)	410	74.5
High (able to run >1 mile)	140	25.5
Race		
White	403	73.3
Nonwhite	147	26.7
Age (y)		
<50	469	85.3
≥50	81	14.7
Sex		
Male	423	76.9
Female	127	23.1
Poverty status		
Poor	193	35.1
Near poor	117	21.3
Not poor	240	43.6
Education		
Less than high school	155	28.2
High school	216	39.3
Some college	179	32.5
Insurance		
No insurance	195	35.5
Public insurance	53	9.6
Private insurance	302	54.9

Table 2: Percentage Distribution: Discharge Disposition by Principal Treatment Group

Disposition	Total (N=550)	Amputation (n=165)* (%)	Reconstruction (n=385) (%)
Home	414	69.1	77.9
Rehab hospital	94	24.2	14.0
Skilled nursing	26	4.2	4.9
Unknown	17	3.0	3.1

*$P<.05$ (χ^2 test) when compared with reconstruction group.

Discharge Disposition and Inpatient Rehabilitation

The distribution of discharge disposition by amputation or reconstruction group is shown in table 2. Amputees were significantly more likely to be discharged to rehabilitation facilities than salvage patients ($P<.05$). Among the patients discharged to their homes, only 1.7% were later admitted to inpatient rehabilitation facilities. The average LOS among patients admitted to inpatient rehabilitation facilities was 34.1±36.2 days, with no significant differences between the amputation and reconstruction groups. None of the patients followed up had any inpatient rehabilitation beyond 6 months postdischarge.

Use of PT Services

Table 3 shows the percentage of patients receiving any PT over the length of the study, by amputation or reconstruction group. Among amputees, 83.0% received some PT over the 2-year follow-up, versus 69.1% among salvages ($P<.01$). The total use of PT services over the course of the follow-up is shown in figure 1. Excluding patients who received no therapy, amputees had significantly more PT visits at 3 and 6 months ($P<.01$ and $P<.05$, respectively). There were no statistically significant differences in utilization between the 2 groups at 12 and 24 months. The mean number of total PT visits over the 2-year follow-up was 33.8 for amputees and 32.4 for salvages ($P>.2$). In addition to amputation versus reconstruction, we performed comparisons of PT use for a number of injury, treatment, and sociodemographic variables. Tables 4 and 5 summarize PT use among clinical and sociodemographic subgroups selected because they showed differences approaching statistical significance or have been shown to be important predictors of outcome in earlier analyses.

Table 3: Percentage Distribution: Use of PT by Principal Treatment Group

Follow-up	Total (N=550) (%)	Amputation (n=165) (%)	Reconstruction (n=385) (%)
3 months	57.5	69.0	52.5
6 months	49.6	60.1	45.1
12 months	34.7	36.7	33.9
24 months	18.5	14.3	20.2
Cumulative total	73.3	83.0*	69.1

*$P<.05$ (χ^2 test) when compared with reconstruction group.

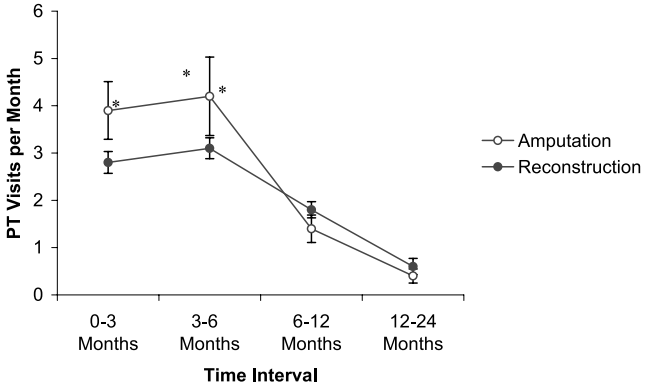


Fig 1. Mean (+/− Standard error of the mean) physical therapy visits per month by treatment group. *$P<.05$, t-test when compared to the reconstruction group.

Patient Satisfaction With the Amount of PT Received

Among patients receiving PT, 16.1%, 18.2%, 32.3%, and 16.7% felt they would benefit from receiving more therapy than they were currently receiving at 3, 6, 12, and 24 months, respectively. Of the remaining patients, more than 90% felt that the amount of PT they were receiving was adequate, and less than 10% felt that they were doing too much PT at any time point.

Perceived Need for PT Services

Table 6 shows the percentage of patients with perceived need for PT as assessed by the patient, the orthopedic surgeon, and the physical therapist, as well as the percent of patients with unmet perceived need for these services. For all measures of PT need, the percentage of patients with need decreases over time. At the 3- to 6-month period, patient self-assessment resulted in a statistically significantly lower level of perceived need than the other 2 measures, while at the 6- to 12- and 12- to 24-month periods, the physical therapist's assessments resulted in higher levels of perceived need. Regardless of the form of evaluation of PT need, the percentage of patients with unmet perceived need increases over time. Over the 12- to 24-month period, 68% to 72% of patients who were assessed to need PT by the 3 measures studied did not receive any services. PT need as assessed by the physical therapist and physician resulted in similar levels of unmet perceived need, while patient self assessment resulted in slightly lower levels of unmet perceived need.

Overall concordance among physician, physical therapist, and patient's assessment of need for PT was measured using κ statistics. Concordance between patient's and physical therapist assessments ranged between .12 and .20 over the 3 time periods tested. Concordance between patient's and physician's assessments ranged between .12 and .20 over the 3 time periods tested. In contrast, concordance was consistently higher for the physician and physical therapist assessments, with κ statistics ranging between .32 and .41 over the 3 time periods tested. Overall, all 3 assessments were equal in 48.4% of cases at the 3- to 6-month time interval, 41.6% of cases at the 6- to

Table 4: Use of PT Over 2 Years of Follow-Up by Selected Characteristics of the Injury

Characteristics	N	% Receiving PT	Mean PT Visits
Total study population	550	73.3	30.7
Principal injury/treatment group			
Amputation	165	83.0	32.0
Partial foot	12	50.0*	19.8†
Below knee	103	81.6	32.3
Through knee	18	88.9	23.7†
Above knee	32	96.9	40.1
Reconstruction	385	69.1	30.1
Foot/ankle/pilon fracture	115	73.9	31.3
Tibia fracture	202	65.8	29.8
Soft tissue injury	68	72.1	29.6
Ipsilateral or contralateral injuries			
Yes	225	83.1	38.0
No	325	66.1*	24.3†
ISS for associated injuries			
<13	388	68.3	26.4
≥13	162	81.5*	37.6†
Muscle injury			
None-mild	365	76.7	31.8
Moderate-severe	185	66.5	30.5
Bone loss (cm)			
≤2	414	72.7	31.4
>2	136	72.8	28.8
VAS pain at 3-month follow-up			
Low pain (<40)	325	77.5	33.8
High pain (>40)	139	69.8*	27.9

*$P<.05$ (χ^2 test) when compared with other categories.
†$P<.05$ (ANOVA, t test) when compared with other categories.

Table 5: Use of PT Over 2 Years of Follow-Up by Selected Characteristics of the Patients

Characteristics	N	% Receiving PT	Mean PT Visits
Total study population	550	73.3	30.7
Smoking status at baseline			
Never smoked	189	79.4	40.4
Quit smoking	160	75.0	33.2
Current smoker	200	66.0*	25.4
Preinjury fitness level			
Low (able to run <1 mile)	410	72.7	29.3
High (able to run >1 mile)	140	75.0	34.7
Race			
White	403	75.4	33.6
Nonwhite	147	67.4	22.4†
Age (y)			
<50	469	72.5	28.9
≥50	81	77.8	41.5†
Sex			
Male	423	70.0	31.0
Female	127	84.3*	38.9
Poverty status			
Poor	193	67.9	23.6
Near poor	117	69.2	25.9
Not poor	240	79.6*	43.6†
Education			
Less than high school	155	68.1*	21.9†
High school	216	71.4	34.1
Some college	179	82.7	42.4
Insurance			
No insurance	195	61.0	19.8
Public insurance	53	60.4	22.1
Private insurance	302	82.2*	43.0†

*$P<.05$ (χ^2 test) when compared with other categories.
†$P<.05$ (ANOVA, t test) when compared with other categories.

Table 6: Number of Study Patients Needing PT, and Percentage of Patients With Perceived Need Who Received No PT Services, as Assessed by the Patient, an Orthopedic Surgeon, and a Physical Therapist, by Months Postinjury

	3–6 Months (n=481)		6–12 Months (n=483)		12–24 Months (n=453)	
PT Need Perceived by:	Need (%)	Unmet Need (%)*	Need (%)	Unmet Need (%)*	Need (%)	Unmet Need (%)*
Patient	233† (48.4)	54 (23.2)	190 (39.3)	84 (44.2)	116 (25.6)	79 (68.1)
Orthopedic surgeon	378 (78.6)	175 (46.3)	252 (52.2)	129 (51.2)	126 (27.8)	91 (72.2)
Physical therapist	376 (78.2)	174 (46.3)	330† (68.3)	182 (55.2)	190† (41.9)	135 (71.1)

*As a percentage of patients with perceived need.
†$P<.05$ (χ^2 test) when compared with number of patients with need as perceived by other evaluators at the same time point.

12-month time interval, and 44.2% of cases at the 12- to 24-month time interval.

Factors Influencing Unmet Need for PT

Table 7 shows the results of the 3 multivariate longitudinal logistic regression analyses of the factors influencing unmet need for PT as assessed by the patient, the physician, and a physical therapist. In all 3 models, increased 3-month VAS pain levels were the strongest predictors of unmet need. Moderate-severe muscle injury was a risk factor for unmet need in both the physician and physical therapist assessment models. Smoking history also had a small effect in the physical therapist's assessments model. Several protective factors were also identified in all 3 models, including: access to private insurance, having some years of college education, and having a high preinjury fitness level. Table 8 shows the most commonly cited reasons for not receiving PT. There were no observable differences between treatment or injury groups in the frequency of reasons cited (data not shown). The data are fairly uniform in showing financial constraints as the most important reason for not accessing PT services (34%–43% of patients), with pain (24%–31% of patients), inconvenience (14%–22% of patients), and disagreement with the treating physician (12%–19% of patients) as secondary reasons.

DISCUSSION

The results suggest a significant amount of unmet need for PT services in the severe lower-extremity trauma population. Regardless of the criteria used to evaluate perceived need, the rate of unmet need for PT among those who need services ranges between 23% and 46% within 6 months of the injury. At 12 to 24 months after the injury, these rates increase to around 70%. Factors associated with increased risk for unmet need included lack of private insurance, pain, lower levels of education, lower fitness levels at time of injury, being a smoker, and having severe muscle injury. The results of the regression analysis are to some extent confirmed by the data gathered from patients regarding the reasons they did not use PT. Lack of financial resources was the primary reason, with pain and inconvenience as the second and third most important causes. The extent of unmet need might be amplified in this population due to the fact that patients who suffer from severe lower-extremity trauma tend to be less educated and have lower insurance rates than the general population.[8] It is also important to note that the current analysis likely underestimates the true level of unmet need, because between 16% and 32% of patients who received some therapy indicated that they needed additional services.

Between 30% and 40% of patients reported disagreement with both the physician and the physical therapist regarding the perceived need for PT services. This is consistent with the low observed rates of agreement between patient and health providers in assessing need reported in previous work.[19] While significant disparities were observed, it is important to note that we cannot determine whether the observed differences indicate misdiagnosis. It is possible that the health care professionals had a more informed view of the true capabilities and limitations of PT. The professionals might have correctly classified patients, even though the patients perceived that they could improve with additional therapy, because in reality the patients had problems which would not be addressed by the currently available techniques. In contrast to both our hypothesis and previous research,[19] orthopedic surgeons and physical therapists were more likely than patients to perceive a need for PT during the first year, and equally or more likely at 2 years. It is important to note that while the 2 measures of PT need ob-

Table 7: Factors Associated With Unmet Need for PT (N=550)

Factor	Patient's Perception (95% CI)	Physician's Perception (95% CI)	Physical Therapist's Perception (95% CI)
Private insurance (vs no insurance)	0.65 (0.57–0.76)	0.63 (0.54–0.75)	0.71 (0.62–0.81)
Moderate-severe muscle injury (vs no or mild muscle injury)	NS	1.12 (1.01–1.28)	1.14 (1.02–1.29)
Some college education (vs less than high school)	0.72 (0.54–0.96)	0.69 (0.51–0.91)	0.70 (0.54–0.92)
High school graduate (vs less than high school)	0.89 (0.74–1.08)	0.95 (0.80–1.07)	0.98 (0.86–1.12)
High preinjury fitness level (vs low pre-injury fitness level)	0.82 (0.70–0.99)	0.77 (0.60–0.97)	0.88 (0.75–1.03)
Current smoker (vs never smoked)	NS	NS	1.22 (1.07, 1.37)
Previous smoker (vs never smoked)	NS	NS	1.12 (0.97–1.30)
VAS pain (range, 1–100)	1.01 (1.01–1.02)	1.01 (1.00–1.01)	1.01 (1.00–1.01)

NOTE. Results from longitudinal logistic regression models, presented as relative risks.
Abbreviations: CI, confidence interval; NS, not significant.

Table 8: Most Commonly Cited Reasons for Not Receiving PT Among Patients Who Felt They Would Have Benefited from PT*

Reason	3–6 Months (n=233) (%)	6–12 Months (n=190) (%)	12–24 Months (n=116) (%)
Too expensive	38	43	34
Too painful	24	31	28
Inconvenient location or office hours	19	14	22
Doctor or therapist prescribed this amount	19	12	16

*When patients selected more than 1 answer, they were asked to choose the main reason. Only the final reason is reported.

tained from the physicians and physical therapists were prospective, the measure obtained from the patient was retrospective. Agreement between physicians and physical therapists regarding perceived need for PT ranged between 30% and 40%. Because little is known about the interrater reliability of the assessment of PT need, we cannot tell if this level of discrepancy reflects systematic differences between the 2 types of health professionals.

An interesting observation was that increased levels of reported pain correlated with increased likelihood of having unmet need for PT. In addition, about a quarter of patients cited pain as the primary reason they were not receiving PT. It is important to emphasize, however, that the variable used in multivariate regression was pain measured at time of interview, which might be different from pain resulting from PT exercises. In this regard it is also interesting to note that in this population, pain was fairly stable over the 2 years of follow-up (data not shown). Thus, additional research will be needed to determine if pain management might be a target for interventions aimed at improving use of PT services.

We must note a number of important limitations of this study. First, the measures of unmet need for PT are based on the subjective assessments of the patient, orthopedic surgeon, and physical therapist as to whether the patient would benefit from PT services. As no criterion standard exists to measure true PT need, it is difficult to estimate the degree to which these assessments of need were accurate, or whether the patients would have benefited from receiving these services. Furthermore, the fact that the physical therapist may have sometimes been involved in the care of the patient, or the fact that the study coordinators, physical therapists, and orthopedic surgeons were often located within a single medical institution, may have resulted in bias in the responses given by the study subjects. Second, the number of PT visits was based on self-report. We know little about the validity of recall data for PT visits, but it is likely that the data suffers from some degree of inaccuracy, even at the 3-month time point. Finally, when making generalizations from these results to the wider trauma population, it is important to consider the role of polytrauma. In this study, patients with moderate to severe brain and spine injuries were excluded, making it difficult to make any generalizations about these results to populations with central nervous system injuries.

CONCLUSIONS

The results of this study differ from the previously published data[5] in that a far greater proportion of the patients in the current study used PT services and that only a small percentage of the visits occurred on an inpatient basis. Differences may reflect the fact that the population in the present study represents a severely injured subgroup of the whole lower-extremity fracture population. The differences in the proportion of inpatient and outpatient visits, however, may reflect changes in treatment preferences over the past 20 years. In contrast to our initial hypothesis, severe lower-extremity trauma patients treated with reconstruction were less likely to use PT services than amputation patients. This is consistent with other observations from this study showing that patients treated by amputation, despite having a more severe injury profile,[20] have lower overall levels of health care service utilization and a faster recovery period than patients treated by reconstruction.[9] Among patients who did receive PT, reconstruction patients did not receive more PT visits than amputation patients. Finally, patients treated by amputation versus reconstruction did not differ in likelihood of having unmet need for PT.

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