Original article

Risk stratification of patients with low back pain seen in physical therapy practice[☆]

J.R. Rodeghero [a, *], C.E. Cook [b], J.A. Cleland [c], P.E. Mintken [d]

[a] OSF Saint James – John W. Albrecht Medical Center, 2500 W. Reynolds St. Pontiac, IL 61764, USA
[b] 2200 W. Main Street, Durham, NC 27708, USA
[c] Physical Therapy Program, Franklin Pierce University, 670 N. Commercial St. Suite 301, Manchester, NH 03101, USA
[d] University of Colorado School of Medicine, Department of Physical Therapy, 13121 East 17th Ave C-244, Aurora, CO 80045, USA

A B S T R A C T

Design: A secondary analysis of a retrospective cohort was conducted using data obtained from a commercial outcomes database.
Objective: To identify predictive characteristics related to patients with lumbar impairments who have a high risk of a bad prognosis (lowest functional recovery compared to visit utilization) as well as those who are at low risk of a bad prognosis (highest functional recovery compared to visit utilization).
Background: Lumbar impairments are highly prevalent and routinely cause people to seek medical care, including physiotherapy. Most prognostic studies focus solely on good outcomes but do not factor in the intensity of care needed to achieve the outcome. Understanding care intensity needed per outcome achieved could help assign appropriate care quantities.
Methods: Data from 6379 patients with lumbar impairments were analyzed to determine predictive characteristics that identify patients who either have a low or high risk of a bad prognosis to physiotherapy care. Multinomial regression was used to identify significant patient characteristics predictive of treatment response.
Results: Statistically significant predictors for high risk categorization included older age, longer duration of symptoms, surgical history, current use of medications, lower levels of disability at baseline, and insurance categorization. Statistically significant predictors of low risk categorization included younger age, male gender, shorter duration of symptoms, no surgical history, higher levels of disability at baseline, and insurance status.
Conclusion: Selected variables were associated with both poor and good recovery. Further research on prognosis, efficacy of physiotherapy care, and cost appear warranted for patients with lumbar impairments.

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1. Introduction

Low back pain (LBP) is a highly prevalent condition (Hoy et al., 2012), is a leading cause of disability (Buchbinder et al., 2013; Hoy et al., 2014), and as a medical condition, is responsible for the sixth highest overall morbidity across the world (Hoy et al., 2012, 2014). Lack of recovery and high recurrence rates likely contribute to the overall problem (Fritz et al., 2013). Direct and indirect costs related to management of LBP have grown at a rate greater than other medical conditions (Martin et al., 2009). The escalating health care costs, including those associated LBP, have been described as unsustainable and in need of an appraisal of the benefits, harms, and expenditures of all interventions (Shaw et al., 2012).

Interventions for the care of LBP have commonly thought to be specific to the patient diagnosis. The diagnostic process for LBP has regularly included imaging such as radiographs or magnetic resonance imaging. The validity of these tests has been challenged, as they have not been shown to positively influence treatment or the outcome of patients with low back pain and add substantial cost (Chou et al., 2011). Dinant et al. (2007) have advocated for a shift from diagnostic to prognostic research and argue that treatments may be better supported by evidence relating patient

characteristics and prognostic factors to outcomes, rather than diagnostic testing.

Early identification of patients with a high risk of a poor prognosis versus those patients with a lower risk of a bad prognosis could provide improved decision making and cost benefits to healthcare providers. Previous research using a psychosocial-based screening tool (STarT) for risk stratification of patients with LBP (Hill et al., 2008) has supported this assumption. The STarT back screening tool includes patient variables related to fear, anxiety, pain, and functional limitations (Beneciuk et al., 2013). Implementation of the tool into primary care settings has demonstrated utility in refining care toward those with needs for benefits in earlier return to work and costs (Foster et al., 2010). The uniqueness of the STarT back screening tool is that it allows clinicians to tailor intensity of care toward those who need it and reduce intensity to those that do not.

The STarT back screening tool has growing evidence to support its use for prognostic risk stratification but may have some limitations related to predicting outcomes from the care of certain providers or interventions (Field and Newell, 2012). In addition, the timing of the risk stratification appeared to influence the risk stratification grouping (Field and Newell, 2012). In a study of military individuals with non-specific LBP, despite being placed in the high risk and having higher initial pain and disability scores compared to the other categories there was little if any difference in outcomes at follow up during routine physical therapy treatment (Fritz et al., 2011). Further, many healthcare organizations do not independently collect psychosocial data such as the STarT back screening tool, relying more on standard demographic and outcomes data within their electronic datasets. As such, further research is needed to identify routinely captured prognostic variables that can improve clinical decision making regarding the most *effective* use of physiotherapy care in patients with LBP. The prognostic research needs to focus the exploration in a similar manner to the STarT back screening tool; in order to carefully evaluate the benefit or lack of benefit of physiotherapy services within the predictive spectrum. Consequently, the purpose of this study was to retrospectively explore potential prognostic variables associated with risk stratification for patients with LBP who have received physiotherapy.

2. Methods

2.1. Study design

This study involved a secondary analysis of a cohort dataset that was originally used in a study that examined the influence of post-professional physiotherapy education on the clinical outcomes of patients with various musculoskeletal impairments (Rodeghero et al., 2015).

2.2. Patient population

The dataset was provided from Focus On Therapeutic Outcomes, Inc., (FOTO) (Knoxville, TN, USA). All patients represented in the dataset were at least 18-years old with musculoskeletal impairments (all body regions) and had complete data (intake scores, discharge scores, and number of visits). All patients received care from June 2012 to June 2013 in outpatient physiotherapy clinics that use FOTO for collecting/measuring patient outcomes.

2.3. Clinical data collection process

All clinical data were input during traditional physiotherapy encounters at initial, follow up and discharge dates of care. During

admission to therapy, patients enter demographic data and complete self-report surveys using Patient Inquiry®, a computer program developed by FOTO. Patients completed self-reported surveys throughout the episode of care and at discharge, depending on his/her clinicians' case management strategies.

2.4. Variables used in the modeling

Patient variables in the initial extraction included: type of impairment (lumbar, shoulder, elbow/wrist/hand, hip, knee, foot/ankle, cervical, other), age, symptom acuity, gender, surgical history, payer type, number of functional comorbidities, exercise history, use of medication at intake, an abbreviated assessment of fear avoidance beliefs, and intake functional status (FS) score. Patient age and intake FS score (rated 0—100%, with 100% being full function) were coded as continuous variables whereas the rest of the variables are coded as categorical variables. Symptom acuity (days from the date of onset to the date of initial therapy evaluation) was categorized as acute (<22 days), sub-acute (22—90 days), and chronic (>90 days). Surgical history of the lumbar region was categorized into five categories (none, and 1—4).

Payer type was categorized into 16 payer sources (e.g., health maintenance organization, Medicare, etc.). Number of functional comorbid conditions was assessed using a list of 30 conditions common to patients entering an outpatient rehabilitation clinic (e.g., arthritis, asthma, diabetes, etc.). Exercise history prior to receiving therapy was categorized into three groups with ascending levels of intensity whereas use of medication at intake was a dichotomous response (yes, no medication). Lastly, patients were classified into high (elevated) or low (not-elevated) fear avoidance beliefs based on screening items developed by Hart et al. (2011). The FOTO FS survey to determine patient-reported functional level has been previously researched with reliability and validity established (Hart et al., 2006, 2012).

2.5. Recoding strategy

Our team evaluated each variable prior to analyses to determine if re-categorization was appropriate. Re-categorization was based on *clinical sensibility* and *distribution trends*, or was categorized through statistical differentiation using receiver operating curve (ROC) statistics (Eng, 2005). Using ROC statistics we categorized functional status at baseline as: 1) <to 49.93 (higher reported disability) and >49.93 (lower reported disability); comorbidities were divided into >12 and ≤to 12; and age was dichotomized as >59 years and other.

Using clinical sensibility we re-categorized surgical history was 1) none and 2) 1 or more surgeries, whereas worker's compensation, litigation, and auto insurance were categorized together based on similarities in patient populations. We further categorized payer types into a) Medicare (all types) and Medicaid, and b) all others (based on private payer sources). Exercise status was dichotomized into ≤1 to 2 times a week, and >2 times a week. Patients were categorized based on the Fear Avoidance Beliefs Physical Activities (FABP-PA) questionnaire as "elevated" (≥12 FABQ-PA) or "not elevated" (≤11 FABQ-PA) (Hart et al., 2011).

Percentage change for function was calculated by taking the difference of the functional score (from baseline to the discharge), and then dividing the difference by the baseline score, followed by multiplying by 100. The end product is a positive or negative percentage change. Others have endorsed percent change from baseline as a mechanism to identify treatment responders [Dworkin et al., 2008]. An example includes the Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials (IMMPACT) who recommended a 30% reduction in pain from baseline as a lower

threshold of success whereas a 50% reduction from baseline is a substantially clinically important change [Dworkin et al., 2008].

2.6. Risk stratification profile

We created a unique variable for prognosis based on one raw variable within the dataset and one newly created variable (percent of functional change) that was based on baseline and discharge functional status: a) total visits and b) percent of functional change. Our goal was to represent a unique group at each tail of the distribution; a group reflective of excellent functional outcome (by percentage change) with minimal total visits and a group reflective of a poor overall functional despite multiple physiotherapy visits. In order to represent a reasonable number of high risk individuals, we captured the highest 35% for visit utilization and the bottom 35% for functional outcome. If individuals demonstrated both conditions they were uniquely coded is 'high risk'.

To represent the low risk group we captured the highest 35% for functional percent recovery and the lowest 35% for visit utilization. If individuals met both conditions they were uniquely coded as 'low risk'. For both groups, there were no instances in which one person was coded in both categories. For coding purposes, we trichotomized the new codes into three categories: a) *high risk* (low outcome, high visits), b) *medium risk* (all individuals not in high or low risk categories) and c) *low risk* (high outcome, low visits) (Fig. 1).

2.7. Determining appropriate number of observations per variable

Homer and Lemeshow (2000) recommended that the minimum observation to variable ratio for a univariate multinomial or logistic regression is 10 but cautioned that this recommendation will likely lead to overfitting a model. With our sample size of greater than 6000, and our current selection of 10 variables, we were in no danger of overfitting the model.

2.8. Data analysis

All analyses were performed using Statistical Package for the Social Sciences, version 22.0 (SPSS Inc., Chicago, Illinois). Descriptive statistics for the full sample were calculated including the values associated with total visits and total episode duration. Continuous variables were represented by original means and standard deviations whereas categorical variables were presented by frequencies using the re-coded values.

Univariate multinomial regression analyses were performed for each of the predictor variables for the trichotomized risk stratification variable. The referent variable used in all analyses was medium risk stratification. Multinomial logistic regression is used to predict the probability of category membership for a dependent variable with two or greater classifications, based on multiple independent variables (Dominguez-Almendros et al., 2011). Multinomial logistic regression analyses use maximum likelihood estimation to estimate model parameters.

Multicollinearity for each the 10 independent variables was evaluated by analyzing correlation matrixes. A correlational finding of $r > 0.7$ between independent variables was used to assess the potential of multicollinearity (Shen and Gao, 2008). Findings in the univariate analyses that yielded P values of 0.20 and under were included in a hierarchical multivariate multinomial predictive model (Freedman, 1983). As with the univariate modeling, the medium risk category was used as the referent category and a P value of ≤ 0.05 was considered significant. We opted not to perform automated stepwise regression, as it often leads to biased regression coefficients (Tibshirani, 2011) and falsely narrow confidence intervals (Altman and Andersen, 1989).

3. Results

Descriptively, with the exception of gender, exercise status, and FOTO FABQ, which did not demonstrate statistical significance, there were differences among all of the seven other remaining predictor variables when categorized by low, medium, and high risk. Notable differences were present in total visits and episode duration as well. There was an average difference of 13 visits and 57 days when high and low risk groups were compared (Table 1).

The univariate multinomial regression modeling represented in Table 2 outlines a number of variables with statistically significant findings. For both forms of univariate analyses (high and low risk comparisons) the medium outcome was the referent category. Statistically significant predictors of high risk categorization included older age (OR = 1.26; 95%CI 1.08, 1.46), longer duration of symptoms (OR = 2.69; 95%CI 2.10, 3.44), a surgical history (OR = 1.45; 95%CI 1.22, 1.72) lower levels of disability at baseline (OR = 0.66; 95%CI 0.57, 0.77), and insurance categorization of workers compensation, auto insurance and litigation (OR = 1.44; 95%CI 1.15, 1.82), as well as Medicare/Medicaid (OR = 1.34; 95%CI 1.14, 1.54). Statistically significant predictors of low risk categorization were younger age (OR = 0.65; 95%CI 0.54, 0.78), shorter duration of symptoms (OR = 0.31; 95%CI 0.26, 0.37), no surgical history (OR = 0.41; 95%CI 0.30, 0.55), current medication use (OR = 1.25; 95%CI 1.05, 1.49), higher disability levels of function at baseline (OR = 1.59; 95%CI 1.34, 1.90) and a payer types of insurance other than Medicare/Medicaid (OR = 0.59; 95%CI 0.49, 0.73).

The hierarchical multivariate regression modeling is represented in Table 3. Low correlations (<0.20) were present for each of the independent variables, thus none of the variables were removed from the multivariate modeling. Statistically significant predictors of high risk categorization included older age (OR = 1.22; 95%CI 1.02, 1.47), longer duration of symptoms (OR = 2.65; 95%CI 2.06, 3.41), a surgical history (OR = 1.40; 95%CI 1.17, 1.68), current use of medications (OR = 1.29; 95%CI 1.10, 1.51), lower levels of disability at baseline (OR = 0.57; 95%CI 0.48, 0.67), and insurance categorization of workers compensation, auto insurance and litigation (OR = 1.98; 95%CI 1.54, 2.53), as well as Medicare/Medicaid (OR = 1.25; 95%CI 1.03, 1.51). Statistically significant predictors of low risk categorization included younger age (OR = 0.78; 95%CI 0.64, 0.97), male gender (OR = 1.24; 95%CI 1.04, 1.48), shorter duration of symptoms (OR = 0.35; 95%CI 0.29, 0.42), no surgical history (OR = 0.46; 95%CI 0.34, 0.62), higher levels of disability at baseline (OR = 1.65; 95%CI 1.37, 1.99), and insurance type other than Medicare/Medicaid (OR = 0.71; 95%CI 0.56, 0.91) and workers compensation, auto insurance and litigation (OR = 0.48; 95%CI 0.35, 0.66).

| Low Risk Category 12.8% | Medium Risk Category 78.0% | High Risk Category 9.2% |

Total Visits (Low) ———————————————→ Total Visits (High)

←———————————————

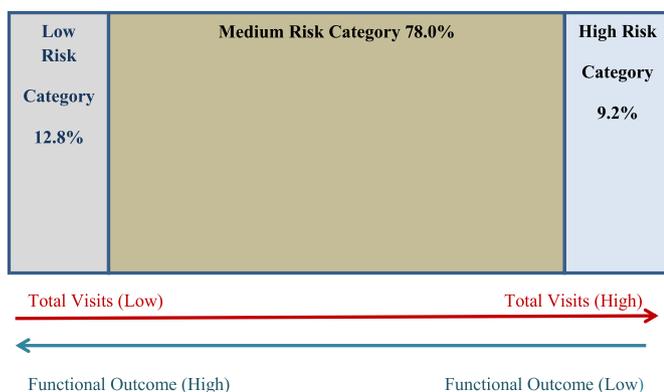Functional Outcome (High)   Functional Outcome (Low)

Fig. 1. Graphical representation of portioning of risk categories.

Table 1
Descriptive variables associated with the study (raw data): N = 6379. Significant values (P < .05) highlighted in bold.

Variable	Total sample mean (SD)/Frequency	High risk (N = 816; 12.8%) frequency	Medium risk (N = 4975; 78%) frequency	Low risk (N = 599; 9.2%) frequency	P Value
Age	54.32 (16.8)	56.66 (16.77)	54.43 (16.76)	50.07 (16.72)	**<0.01**
Gender	2625 = Male	325 = Male	2035 = Male	265 = Male	0.11
	3754 = Female	491 = Female	2940 = Female	323 = Female	
Comorbidities	4.75 (3.23)	5.01 (3.37)	4.75 (3.20)	4.36 (3.14)	**<0.01**
Duration of symptoms	1430=<22 days	76=<22 days	1078=<22 days	276=<22 days	**<0.01**
	4949 = 22 days or greater	740 = 22 days or greater	3897 = 22 days or greater	312 = 22 days or greater	
Surgical history	5196 = None	612 = None	4046 = None	538 = None	**<0.01**
	1183 = 1 or more	204 = 1 or more	929 = 1 or more	50 = 1 or more	
Exercise status	2528=>2 days a week	312=>2 days a week	1970=>2 days a week	246=>2 days a week	0.42
	3829 = 2 or less per week	500 = 2 or less per week	2988 = 2 or less per week	341 = 2 or less per week	
Insurance type	684 = Group A	107 = Group A	522 = Group A	55 = Group A	**<0.01**
	2065 = Group B	308 = Group B	1621 = Group B	136 = Group B	
	3630 = Group C	401 = Group C	2932 = Group C	397 = Group C	
Medication use	3610 = Yes	481 = Yes	2769 = Yes	360 = Yes	**0.01**
	2767 = No	335 = No	2204 = No	228 = No	
Functional status at intake	49.73 (12.73)	52.74 (10.87)	49.74 (12.93)	45.46 (12.19)	**<0.01**
% Change in functional status	43.97 (232.38)	1.96 (12.43)	40.22 (60.85)	134.02 (727.87)	**<0.01**
FOTO FABQ	2457 = 0–11 score	324 = 0–11 score	1919 = 0–11 score	214 = 0–11 score	0.45
	3922 = 12–24 score	492 = 12–24 score	3056 = 12–24 score	374 = 12–24 score	
Total visits	9.89 (6.74)	17.11 (8.25)	9.42 (5.83)	3.90 (1.06)	**<0.01**
Total episode duration (days)	44.88 (43.35)	76.83 (73.35)	42.61 (35.35)	19.80 (16.29)	**<0.01**

Payer type: Group A = Work Comp, Litigation, Auto; Group B = Medicare and Medicaid; Group C-others.

4. Discussion

Predicting the outcomes of patients with lumbar impairments over time can be challenging, since the course of LBP is complex, being affected by psychosocial and physical factors (Hoogendoorn et al., 2000). In the present study, we accessed existing data from a large database that allowed us to analyze a wide range of commonly captured prognostic variables that may inform treatment response to physiotherapy. Data relative to functional outcomes was collected using the FOTO FS survey using the lumbar computer adaptive testing (CAT). The FOTO lumbar CAT is widely used in clinical practice (Werneke et al., 2009, 2011) and has been shown to exhibit high levels of reliability and disability. Predictive variables from this database could potentially have transferability

to other clinical practice sites, especially those that do not routinely capture psychosocial variables during a baseline assessment.

Past risk stratification tools have shown promising findings but recent work suggests that the tool may have limitations (Field and Newell, 2012). Previous research has investigated various independent prognostic factors finding relationships with poorer outcomes when analyzing; duration of symptoms (Melloh et al., 2013), body mass index (BMI) (Shaw and Tveito, 2012; Brooks et al., 2013), pain intensity (Jensen et al., 2010; Campbell et al., 2013), coping behaviors (Chou and Shekelle, 2010; Harland and Ryan, 2013), baseline disability (Jensen et al., 2010; Melloh et al., 2013), general health status (Chou and Shekelle, 2010), activity level before onset (Jensen et al., 2010; Hendrick et al., 2013), third-party claims (Jensen et al., 2010), and psychosocial variables (Coste et al., 2004;

Table 2
Multinomial logistic regression univariate modeling including *P* values, odds ratios and 95% confidence intervals. Dependent variable = outcome per utilization trichotomized: Referent category = moderate outcome. Significant values (P < .05) highlighted in bold.

Variable	Multinomial categorization outcome per utilization	Odds ratios (95% confidence interval)	P value
Age (<59; 59 and older)	Higher Risk	1.26 (1.08, 1.46)	**<0.01**
	Lower Risk	0.65 (0.54, 0.78)	**<0.01**
Gender (M or F)	Higher Risk	0.96 (0.82, 1.11)	0.56
	Lower Risk	1.18 (0.99, 1.41)	0.05
Duration of Symptoms (current episode) (1=>22 days, 2 = ≤22days)	Higher Risk	2.69 (2.10, 3.44)	**<0.01**
	Lower Risk	0.31 (0.26, 0.37)	**<0.01**
Exercise status (1=<3 days a week; 2 = 0–2 days)	Higher Risk	1.05 (0.91, 1.23)	0.48
	Lower Risk	0.91 (0.76, 1.08)	0.31
Surgical History (1 = None, 2 = 1 or greater)	Higher Risk	1.45 (1.22, 1.72)	**<0.01**
	Lower Risk	0.41 (0.30, 0.55)	**<0.01**
Payer Type (a = work comp, litigation, auto; b = Medicaid/Medicare; 3 = other)	Higher Risk	a 1.44 (1.15, 1.82)	**<0.01**
		b 1.34 (1.14, 1.57)	**<0.01**
	Lower Risk	a 0.75 (0.56, 1.01)	0.06
		b 0.59 (0.49, 0.73)	**<0.01**
Comorbidities (1 = 0–12; 2=>12)	Higher Risk	0.91 (0.57, 1.47)	0.71
	Lower Risk	0.88 (0.51, 1.55)	0.88
Medication Use (yes or no)	Higher Risk	1.14 (0.93, 1.32)	0.08
	Lower Risk	1.25 (1.05, 1.49)	**0.01**
FABQ score (1 = 1–11, 2 = 12–24)	Higher Risk	0.95 (0.82, 1.10)	0.54
	Lower Risk	1.09 (0.92, 1.31)	0.30
Functional Status at Baseline (≤to 49.93; >49.93)	Higher Risk	0.66 (0.57, 0.77)	**<0.01**
	Lower Risk	1.59 (1.34, 1.90)	**<0.01**

FABQ=Fear Avoidance Beliefs Questionnaire.

Table 3
Hierarchical multinomial logistic regression modeling including *P* values, odds ratios and 95% confidence intervals. Dependent variable = outcome per utilization trichotomized: Referent category = moderate outcome. Nagelkerke = 0.10. Significant values (P < .05) highlighted in bold.

Variable	Odds ratios (95% confidence interval)	P-value
Higher risk of bad outcome		
Age (<59; 59 and older)	1.22 (1.02, 1.47)	**0.03**
Gender (Male or Female)	0.91 (0.78, 1.06)	0.24
Duration of symptoms (1=>22 days, 2=<22days)	2.65 (2.06, 3.41)	**<0.01**
Surgical history (1 = None, 2 = 1 or greater)	1.40 (1.17, 1.68)	**<0.01**
Patient takes medication (Yes or No)	1.29 (1.10, 1.51)	**<0.01**
Functional status at baseline (<to 49.93; >49.93)	0.57 (0.48, 0.67)	**<0.01**
Insurance (a = work comp, litigation, auto; b = Medicaid/Medicare; 3 = other)	1.98 (1.54, 2.53)	**<0.01**
	1.25 (1.03, 1.51)	**0.02**
Lower risk bad outcome		
Age (<59; 59 and older)	0.78 (0.64, 0.97)	**0.03**
Gender (Male or Female)	1.24 (1.04, 1.48)	**0.02**
Duration of Symptoms (1=>22 days, 2=<22days)	0.35 (0.29, 0.42)	**<0.01**
Surgical History (1 = None, 2 = 1 or greater)	0.46 (0.34, 0.62)	**<0.01**
Patient Takes Medication (Yes or No)	1.06 (0.88, 1.28)	0.48
Functional Status at Baseline (<to 49.93; >49.93)	1.65 (1.37, 1.99)	**<0.01**
Insurance (a = work comp, litigation, auto; b = Medicaid/Medicare; 3 = other)	0.48 (0.35, 0.66)	**<0.01**
	0.71 (0.56, 0.91)	**<0.01**

Melloh et al., 2009; Beneciuk et al., 2013; Glattacker et al., 2013). To our knowledge, these variables were not explored for their ability to risk stratify in a manner explored in our study; through assessment of intensity of care and its relationship to a functional outcome. Consequently, despite this substantial body of research, there is still uncertainty on the best prognostic factors for LBP.

We found a number of factors that predicted a higher risk for a poor outcome that substantiate findings from previous literature. Having a longer duration of symptoms has been shown to predict a poor outcome in prior studies (Dunn and Croft, 2006). Older age has also been reported as a negative factor in prognosis for patients with LBP (Henschke et al., 2008; Hayden et al., 2009; Jensen et al., 2010; Fritz et al., 2013). Evidence regarding a history of surgery is mixed as Coste et al. (2004) reported that prior low back surgery was independently associated with delayed recovery whereas Gregg et al. (2014) identified that patients with a history of spine surgery were more likely to experience clinically relevant improvements in LBP. However, none of these variables were analyzed in a similar manner that we employed in which outcome consisted of both FS and total visit investment.

Lower levels of disability predicted a poor prognosis in this study; a finding that was observed previously by others (Petersen et al., 2007). Our findings match what we see clinically; patients with lower levels of disability may be more chronic in nature whereas those that have higher levels of disability may be more acute and likely to do better as the acuity resolves. Further, having lower levels of disability may also reduce the risk of a larger improvement in overall outcomes, a conundrum that is common is outcomes research (patients with higher levels of severity, often have more room for gains). Medication use may also affect prognosis, as these patients are more likely to have a longer duration of symptoms and more comorbidities (Carragee et al., 2004; Martin et al., 2009).

As stated, what is unique about the present study and risk stratification in general is that we also investigated factors that predicted a good outcome with minimal resources. This is an interesting aspect that was also utilized by the STarT back screening group. In our study, younger age, a shorter duration of symptoms, no surgical history, less medication usage, higher levels of disability at baseline and having a payer type other than Medicare/Medicaid suggested a good outcome with very few visits. These findings are also reflective of present literature that has examined prognosis of individuals with LBP. Verkerk et al. (2013) also identified shorter duration of symptoms, higher baseline disability, and younger age as predictors of absolute recovery at both 5 and 12-month follow-ups. Furthermore, Anema et al. (2009) found that patients who were not on pain medications and had no history of surgery had an earlier return to work. We feel that recognition of those who are likely to improve without intensive care is just as valuable as recognizing those who need intensive services; with potential benefits associated with reducing overall unnecessary care.

4.1. Limitations

This study suffered the inherent limitations of retrospective data utilization that has been outlined previously (Pryor and Lee, 1991). Patient data were only extracted for a limited number of physiotherapists, so the data cannot be considered a representative sample of patients with lumbar impairments in the FOTO database. We only included and analyzed patient data that included both intake and discharge scores, therefore we do not know how the outcomes of patients that did not complete an episode of care. We did not attempt to collect missing data for each group, as analysis of missing dependent variables would pose a threat to validity. We cannot exclude the possibility of selection bias and we did not collect data on the type of physiotherapy treatment provided, as this was not readily available from the database.

5. Conclusion

The results of this exploratory study provide additional prognostic information about patients receiving physiotherapy for low back impairments. The analyses generated significant prognostic variables allowing us to create models that may identify patients that may not be good candidates for physiotherapy (high-risk) and those that may do well with limited physiotherapy (low-risk). Identifying the variables prognostic of such a response could be of benefit to prioritize treatments and/or reduce the number of visits and therefore cost of care in this group of patients. Further prospective research is needed on the prognosis of patients seeking physiotherapy care for LBP as it relates to cost, timing of physiotherapy care and the ultimate cost/benefit ratio.

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