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Examination of the course of low back pain intensity based on baseline predictors and health care utilization among patients treated in multidisciplinary pain clinics: A Quebec Pain Registry study

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Abstract

Objectives: The study objectives were to identify baseline predictors of low back pain severity changes over a one-year period among patients attending multidisciplinary tertiary clinics and determine whether health care utilization impacts on this outcome.

Methods: This is a retrospective cohort study using the Quebec Pain Registry (QPR). A total of 686 low back pain (LBP) patients (55.8% females; mean age = 56.51±14.5 years) from the QPR were selected for this study. Patients completed self-report questionnaires and nurse-administered questionnaires before their first appointment at a multidisciplinary pain treatment center. Analysis was conducted using linear growth model.

Results: There was a modest (10%) improvement in pain severity scores over a 12-month period. Pain catastrophizing and depressive symptoms predicted higher baseline levels of pain severity ($p < 0.001$). Having used self-management approaches over the past 6 months was associated with higher levels of pain severity at 12 months ($p < 0.001$).

Discussion: Results from this study showed no clear pattern of association between the use of different treatment disciplines and pain severity over the first year following multidisciplinary treatment intervention. These results raise an important question as to the best way of utilizing scarce multidisciplinary resources to optimize cost-effectiveness and improve outcomes among complex, chronic LBP patients.

Key Words: low back pain; Quebec Pain Registry; health care utilization; treatment response; tertiary care

Introduction

Low back pain (LBP) is conceptualized as a cluster of symptoms rather than as a disease, and its etiology remains often unknown (1, 2). A recent systematic review has found the mean point, 1-month, 6-month and lifetime prevalence of LBP to be 18.3%, 30.8%, 38.0%, and 38.9%, respectively (3). Among diseases examined in a large study investigating global disease burden, chronic LBP was the condition associated with most disability and was the sixth for disease-related burden (4). LBP is the most frequent reason for seeking primary care services (5) and a very common reason for avoidable health care consultations (overdiagnosing, overtesting (repeated imaging) and overtreating (long-term opioid use)) (6-10). Low back pain is a very heterogeneous condition that can be classified clinically into three broad categories: nociceptive pain, neuropathic pain, and central sensitization pain (11).

There is a substantial body of literature supporting the role of psychological factors in the development and maintenance of LBP almost to the same extent as clinical factors (12, 13). Given this, treatments that incorporate a biopsychosocial perspective are now recognized as the gold standard for treatment of chronic LBP as well as chronic pain in general. Indeed, literature reviews suggest some benefits (poor to moderate quality of evidence) of multidisciplinary programs or rehabilitation on various LBP outcomes including pain, disability and return to work (14-17). It is important to note that the impact of such multidisciplinary approach remains modest with typically only 10% improvement in pain-related outcomes such as pain intensity and disability (14).

Tertiary multidisciplinary clinics typically offer tailored treatment plans where decisions of including one or multiple disciplines in a patient's treatment plan and timing for the

inclusion of these resources are made on a case by case basis. It is unclear however in the context of tertiary, multidisciplinary clinics what baseline predictors and health care components are most associated with improved pain severity. Such tertiary care clinics are costly and waiting times can be up to two years to access such specialized settings (18). In this context, it is important to maximize these scarce resources and optimize the cost-effectiveness ratio of these interventions. An often overlooked issue is whether patients who are heavy health care utilizers respond to these treatments (e.g., decreased pain, improved functioning and/or quality of life). To date, no study has examined how LBP patient characteristics and types of services accessed in tertiary care clinics are associated with treatment outcomes.

The study objectives were to (1) determine predictors of baseline pain severity and rates of change in pain severity over a one year period among patients initiating tertiary care multidisciplinary pain treatments and (2) examine which components of multidisciplinary treatments (psychological, physical, interventional and pharmacotherapy) are associated with pain severity scores.

Materials and Methods

Participants

Patients with chronic low back pain were selected from a database of chronic pain patients who were enrolled in the Quebec Pain Registry (QPR; www.quebecpainregistry.com). The QPR is a large registry (N > 9,000 patients) of patients referred to large multidisciplinary pain treatment clinics (dedicated centers of expertise) in the province of Quebec, Canada and was created to provide data (sociodemographics, clinical descriptors and outcome measures) on patients for administrative, clinical and research purposes (19). Patients seen at these multidisciplinary pain clinics were offered individualized treatment plans that could include a combination of interventions, pharmacotherapy, physical treatments and psychological treatments. More than 90% of enrolled patients provided consent for their data to be used for research purposes.

For the purpose of this study, patients were selected from the QPR and included in the analyses if they (1) received a diagnosis of LBP (without radiculopathy, with radiculopathy, or diffuse LBP), (2) had a pain duration of at least 3 months, (3) were enrolled in the QPR between November 2008 and May 2011, (4) completed baseline nurse-administered questionnaire and patient-administered questionnaire, and (5) completed at a minimum one follow-up patient self-reported questionnaire (6 and/or 12 months). Patients were excluded if their primary pain condition was related to cancer. To be enrolled in the QPR, all patients had to attend one of three designated tertiary care clinics of the Quebec Pain Centres of Expertise (Centre hospitalier de l' Université de Montréal (CHUM), McGill University Health Centre (MUHC), and Centre hospitalier de

l' Université de Sherbrooke (CHUS)), be 18 years old or older, speak and write English and /or French and be cognitively able to complete questionnaires (19).

Procedure

The institutional research ethic boards of the CHUM, MUHC and CHUS approved the QPR project. Patients seen for a first appointment at one of the three participating clinics were enrolled successively in the QPR. Patients were informed that data collected as part of the QPR was primarily used for administrative and clinical purposes and if they consent, for research purposes.

Data was collected via patient self-report and nurse-administered questionnaires. The patient self-report questionnaire was designed to gather information on patient's sociodemographic situation and biopsychosocial measures. The nurse-administered questionnaire was designed to collect information regarding patient's medical/clinical profile using a standardized telephone interview protocol. These two questionnaires were administered before patient's first clinic appointment as well as 6 and 12 months after initial visit. While the 6-month follow-up was targeting all patients, only active patients (still undergoing treatment at one of the participating clinics) were offered the 12-month follow-up (to minimize patient burden).

Questionnaires and Measures

Patient self-report questionnaire

Numeric Rating Scale for pain intensity (NRS)

The NRS(20) is an 11-point scale where patients are asked to rate their pain on a scale ranging from 0 ("no pain at all") to 10 ("worst possible pain"). The NRS has been shown to have good to excellent psychometric properties (in terms of reliability, validity and

sensitivity to change) (20). In this study, NRS score represent the average pain intensity over the previous seven days.

Brief Pain Inventory-10 (BPI-10)

The BPI-10 (21) is a modified version of the original BPI (22-24) that assesses 10 domains of daily pain-related interference. For each item, patients are asked to rate the extent to which pain has interference with this activity over a one-week period on a scale ranging from 0 (“does not interfere”) to 10 (“completely interferes”). Domains measured include general activity, mood, mobility, normal work, relationships with others, sleep, enjoyment of life, self-care, recreational activities, and social activities. An average score of the 10 items is created, with higher average indicating greater pain interference. The BPI has good validity and sensitivity to change among chronic pain patients (25). The French version of the BPI has been created using a forward-backward translation method (26).

Pain Severity (PEG)

In order to create a pain severity variable, the NRS pain intensity score and two other items from the BPI-10 (enjoyment of life and general activities) were averaged into a single score. The PEG (Pain, Enjoyment, General activity) (27) has been shown to have adequate reliability and validity to measure pain intensity and severity in chronic pain patients (27).

Beck Depression Inventory-I (BDI-I)

The BDI-I (28, 29) contains 21 self-report items assessing levels of depressive symptoms including both somatic and psychological symptoms. Patients must choose one of four statements for each item that best describes how they are feeling. Items range from 0 to 3

and higher total scores (ranging from 0 to 63), computed by summing all items, indicate higher levels depressive symptoms. The BDI-I has excellent reliability and validity in a wide range of medical populations (30, 31).

Pain Catastrophizing Scale (PCS)

The PCS (32, 33) is a 13-item scale assessing levels of rumination, magnification and feelings of helplessness related to the pain experience. Participants are asked to rate each item on a scale from 0 (“not at all”) to 4 (“all the time”). Total score is computed by summing all items and higher total score indicates greater tendency to catastrophize in the face of pain. The scale has good psychometric properties (Cronbach alpha of .87; convergent validity: moderate correlation with measures of anxiety $r = .32$ and negative affect $r = .32$; reliability: 10-week test-retest reliability $r = .70$) (32, 34, 35).

Nurse-administered questionnaire

Pain diagnosis

Pain diagnoses were made by treating physicians at the MPT center according to a grid of pain diagnoses that was elaborated specifically for the QPR. This grid (36) was conceived by four experienced pain physicians (anesthetists and neurosurgeons) and contained three types of pain-related codes: pain location, type of disorder, and suspected etiology. The diagnosis of interest for the present study was low back pain and could be specified as follows by the treating physicians: low back pain without radiculopathy (absence of pain radiating to the leg and typically localized to the spine and/or paraspinal), low back pain with radiculopathy, and diffuse low back pain.

Treatments

Six and 12 months after enrollment in the QPR, patients were asked whether they had received treatments (at the MPT center or elsewhere) in four different categories over the previous six months: interventional (injections, implantable pump or neurostimulator, surgery), psychological (psychotherapy, group therapy), self-management (training in relaxation, meditation, hypnosis, visualisation, distraction, self-help support group), and physical (physiotherapy, occupational therapy, hydrotherapy, electrostimulation, intramuscular stimulation, ultrasound, biofeedback, acupuncture, massotherapy, chiropractic care, osteopathy, reflexology, therapeutic touch, reiki, magnet therapy) at the tertiary care clinic or in the community. Patients were also asked by the research nurse to list their current pain medications (name, dose frequency, side effects) at each visit.

Data analysis

In order to examine changes in pain intensity over time as a response to treatment and taking into account baseline characteristics, a linear growth curve model was used. Three models were compared using the *Lavaan* growth function in R version 3.3.0. The first model (basic model) contained only the pain severity (PEG) scores at baseline, 6- and 12-month follow-ups and the latent intercept and slope variables. Second, the addition of baseline characteristics (age, sex, pain duration, depressive symptoms, pain catastrophizing) predicting the intercept and slope were added. Lastly, time-varying treatment utilization variables (whether or not they had utilized psychological, self-management, physical or interventional approaches or used opioids in the last 6 months) were added for the 6- and 12-month pain severity (PEG) scores. Models were compared using the root mean square error of approximation (RMSEA), with lower values indicating better fit. A RMSEA value below 0.05 is considered a good model fit. Missing

data was handled using full information maximum likelihood. General recommendations for growth curve modeling suggest that sample sizes greater than 100 patients can provide good model fit.(37)

Results

Sample size characteristics

A final sample of 686 LBP patients was retained for the analyses (Figure 1).

Comparisons with patients who were excluded from these analyses because of exclusion criteria or drop outs ($n = 294$) and those who were included in the analyses ($n = 686$) revealed no significant difference in patients' age, sex, baseline measures of pain intensity, pain interference, or pain duration (all $P > 0.05$ and/or Cohen's d value < 0.4 / $\phi < 0.3$).

More than half of participants were female ($n = 383$; 55.8%) and aged on average 56.5 years ($SD = 14.5$). Patients had a median pain duration of 4 years (mean \pm SD = 7.7 \pm 9.2 years) and an average intensity of 6.8/10 ($SD = 1.9$). Other patient characteristics are presented in Table 1. One quarter of patients ($n=182$) had at least one additional chronic pain diagnosis (134 patients had one additional pain condition, 45 patients had two additional pain conditions while three patients had three additional pain conditions). Pain comorbidities are shown in Table 2.

More than half of patients ($n=373$) were diagnosed with lumbar pain with radicular pain while over one third of patients ($n=247$) had lumbar pain without radicular pain. The remaining of patients were diagnosed with diffuse lumbar pain ($n=66$). Pain etiologies as established by the treating physician based on available medical and imaging information are shown in Figure 2. Disc disorder was the most prevalent etiology of low back pain among patients diagnosed with lumbar pain with radicular pain, while facet joint was the most prevalent etiology among patients with lumbar without radicular pain and diffuse lumbar pain.

Types of treatments patients received were categorized into psychological approaches, interventions, and physical approaches. Details of the types of treatments received within each of these categories are shown in Figure 3. Self-management techniques were the approach most often reported by patients. Very few patients received interventions (surgery, stimulator) other than injections. There was a greater variety of physical treatments received, with physiotherapy, hydrotherapy and massotherapy being among the most frequently reported treatments.

Pain severity over time

On average, patients reported moderate to severe pain intensity at baseline (mean±SD = 6.8±1.9) that decreased by less than 10% at the 12-month follow-up (mean±SD = 6.0±2.3). Similarly for pain interference, patients on average presented to the pain clinic with a moderate level of pain interference (mean±SD = 59.1±21.1) that decreased by less than 10% at the 12-month follow-up (mean±SD = 51.7±23.6). Global pain severity scores representing pain intensity and interference decreased from 6.1±2.01 at baseline to 5.4±2.3 at the 12-month follow-up.

Subgroup analysis showed that 28.3% of patients improved in terms of pain severity (defined as a 20% or more decrease in their PEG score from baseline to 12 months), 65.7% of patients had unchanged pain severity, while 3.4% of patients deteriorated (defined as a 20% or more increase in their PEG score from baseline to 12 months).

When looking at pain intensity alone, 29.6% of patients improved (20% or more reduction on the NRS-11), 57.7% of patients remained stable, and 12.7% of patients reported increased pain (20% or more increase on the NRS-11) from baseline to 12 months.

Predictors of pain severity change

Of the three models tested, the full model (see Figure 4) containing the baseline characteristics and time-varying predictors provided equal fit to the model without time-varying predictors (RMSEA = 0.046) (see Table 3 for details). Results of this model identified several significant baseline predictors of initial pain severity levels (intercept), including initial level of depressive symptoms ($p = <0.001$; 0.4 point increase on the PEG for every 10-point increase on the BDI), and pain catastrophizing ($p = <0.001$; 0.6 point increase on the PEG for every 10-point increase on the PCS).

There were no significant predictors of rates of change in pain severity scores over time. Lastly, the only time-varying predictor of pain severity was use of self-management strategies at 12 months (significant predictor of pain severity at 12 months, $p = 0.030$).

Using self-management strategies increased was associated with increased pain severity.

Table 3 provides details of parameter estimates for all variables included in the model.

Further examination of these results were conducted to examine levels of depressive symptoms among those who utilized vs. did not utilize psychological approaches or self-management approaches at 12 months. Results of independent t-tests showed that patients who did or did not use psychological approaches at 12 months differed in terms of depressive symptom levels at 6 months (mean \pm SD for psychological users = 26.0 ± 11.6 ; mean for non-psychological users = 16.4 ± 10.0 ; $p < 0.001$) and 12 months (mean for psychological users = 26.5 ± 13.6 ; mean for non-psychological users = 15.9 ± 9.9 ; $p < 0.001$). There were no significant differences in levels of depressive symptoms at 6 or 12 months between patients who reported using pain self-management approaches at 12 months ($p > 0.05$).

Discussion

In this study of LBP patients followed over the first 12 months of attending a tertiary care multidisciplinary pain treatment clinic, we found an average of 10% improvement in pain severity scores. This is consistent with a review of the literature finding modest benefits of multidisciplinary treatments for low back pain (14). Higher levels of depressive and catastrophizing symptoms were associated with higher initial levels of pain severity.

None of the baseline characteristics were associated with changes in pain severity over time. Having used self-management approaches over the past 6 months was associated with increased 12-month pain severity.

Consistent with the body of literature suggesting that chronic LBP involves emotional, cognitive and medical aspects (38, 39), significant predictors of LBP severity were psychological in nature. It had been suggested in the literature that catastrophizing might not be an independent construct but rather a cognitive construct associated with depression in LBP patients. Results from the present study reinforces the importance of considering catastrophizing separately from depressive symptoms since it predicted rates of change in pain severity over time while depressive symptoms did not. Study results are compatible with the literature that typically suggests pain catastrophizing is a risk factor for chronic pain and poor pain-related outcomes (13, 40).

Consistent with the chronic pain literature suggesting that psychological factors are important contributors to the pain experience (41, 42), depressive levels were positively associated with baseline pain severity. Depressive symptoms at baseline did not influence rates of pain severity changes over time, suggesting that the severity of depressive symptoms does not influence rate at which patient's pain severity will change while

receiving MPT. A study among chronic pain patients found that the presence/absence of depression did not influence treatment response, however different sets of predictors of treatment response were found for depressed compared to non-depressed patients (43). As detailed below, it appears that levels of depressive symptoms change over time; patients with higher levels of depressive symptoms at 12 months were more likely to have used self-management approaches.

Treatments categories utilized and treatment outcomes

Time-varying predictors included in the model were primarily related to the types of treatments received. Results showed that over the first 6 months after treatment initiation, types of treatment received are not associated with pain severity. It is possible that this time period is relatively short, given that a few appointments might be necessary to specify or optimize a treatment plan.

Opioid status at 6 or 12 months was not associated with pain severity at either of these time points. As suggested by others, evidence to support the long-term effectiveness of opioids in reducing chronic pain is lacking (44). Furthermore, while there is no causal link established, opioid therapy has been shown to be associated with worse clinical outcomes among LBP patients, such as increased odds of work loss compared to patients not on opioid therapy (45).

The use of self-management approaches was a significant predictor of pain severity at 12, but not 6 months. Interestingly, there were no significant associations between interventional, physical treatments or opioid use and pain severity outcome.

Overall, no specific patterns of health care utilization and treatment outcome emerged from this study. The heterogeneity of LBP population, including the one comprising the

current study`s sample, makes it difficult to detect treatment responses and to generalize results. A systematic review of psychosocial factors associated with multidisciplinary treatment outcomes for LBP (46) highlighted the heterogeneity in patient profiles, treatment targets and deliveries. This heterogeneity makes it difficult to evaluate whether and whom among LBP patients benefit from specialized interventions (46). A review of the literature suggested that targeting treatments for LBP patients based on genetic, psychological and behavioral profiles might better answer patients` needs and enhance treatment responses (47). While a promising research avenue, results from such approaches are inconclusive (48). It is possible that common factors that are not specific to a unique intervention are more important than the intervention itself. A systematic review of multidisciplinary back training has shown a significant impact of interventions on quality of life and work participation, but not pain intensity or interference and this was regardless of the intensity of given interventions (49).

In this study, patients utilizing self-management approaches faired worse in terms of pain severity at 12 months. They did not exhibit higher levels of depressive symptoms compared to non-users. This is unlike patients who received individual of group therapy; these patients presented with higher levels of depressive symptoms at 6 and 12 months after treatment initiation. Systematic reviews of psychological interventions for chronic pain show mild benefits of such approaches on pain outcomes (50). Results from the current study showed more severe pain among those using self-management approaches (relaxation, hypnosis, meditation, support group).

Globally, results showed that patients with more complex psychological profiles start with higher pain severity. Regardless of the type of treatments receives, most patients

show a minimal improvement in their pain severity. From a cost-effectiveness perspective, these results are worrisome in that these patients are accessing more multidisciplinary resources is not associated with improved outcome.

Study strengths and limitations

Strengths of this study include its large sample size, follow-up time, and the wide range of variables considered. Nonetheless, this study has also limitations. First, health care utilization information was obtained by self-report as opposed to medical chart review. While the latter could have provided more precise information, the use of self-report made it possible to gather information about health care utilization in the community while the patient also attends MPT center. Second, the study was based on LBP patients at the tertiary care level and it is unclear the extent to which these results can be generalized to other chronic pain populations and to other settings. Third, one quarter of patients were lost to follow-up, which could have impacted on the generalizability of the results. Data showed that most of the missing follow-ups were due to an inability to contact patients or patients failing to return their questionnaires. Last, patients did not complete a functional outcome specific for low back pain. Such measure could have deepen our understanding of the impact of MPT on patient's level of functioning. In the context of a chronic pain registry that included all different kinds of chronic pain conditions, it was decided to only administer general outcome measures for chronic pain.

Conclusions

Results from this study showed no clear pattern of association between the use of different physical, psychological, interventional and pharmacological approaches and

levels of pain severity over the first year of multidisciplinary treatment intervention. In some cases, using self-management approaches was associated with more severe pain. These results raise an important question as to the best way of utilizing scarce multidisciplinary resources to optimize cost-effectiveness and improve outcomes among complex, chronic LBP patients.

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Figure caption

Fig 1. Study flow diagram.

Fig 2. Pain etiology. Results show the different types of pain etiology (in terms of percentage of patients) for each pain diagnosis (lumbar without radicular pain, lumbar with radicular pain and diffuse pain). Pain etiology was determined by the treating physician based on available medical and imaging information.

Fig. 3. Details of the types of interventions and treatments received within each of the treatment approaches at 6 (grey lines) and 12 (black lines) months.

Fig. 4. Linear growth model tested. S: slope; I: intercept. BPI: Brief Pain Inventory total score. BDI: Beck Depression Inventory total score. PCS: Pain Catastrophizing Scale total score. Duration: Pain duration at the time of the initial visit. PEG: Measure of pain severity at 0 (PEG0), 6 (PEG6) and 12 (PEG12) months. Psych: Whether patients received psychological treatments. Phys: Whether patients received physical treatments. Interv: Whether patients received interventions. SF: Whether patients engaged in self-management approaches taught. Opioids: Whether patients were on opioid therapy.

Table 1. Descriptive statistics

Variables	Means \pm SD or N(%)
Age	56.5 \pm 14.5
Sex	Female 383 (55.8)
	Male 303 (44.2)
Duration (years)	7.7 \pm 9.2
BASELINE CHARACTERISTICS	
Pain severity (PEG)	6.1 \pm 2.01
Depressive symptoms (BDI-I)	18.6 \pm 10.0
Pain catastrophizing (PCS)	30.5 \pm 12.5
6-MONTH CHARACTERISTICS	
Pain severity (PEG)	5.5 \pm 2.3
Depressive symptoms (BDI-I)	17.6 \pm 10.9
Pain catastrophizing (PCS)	27.0 \pm 13.6
Psychological techniques used	Yes 114 (16.6)
	No 572 (83.3)
Self-management approaches	Yes 262 (50.7)
	No 255 (49.3)
Physical techniques used	Yes 348 (50.7)
	No 338 (49.3)
Interventional techniques used	Yes 408 (59.5)
	No 278 (40.5)
Opioid use	Yes 267 (55.1)

No 218 (44.9)

12-MONTH CHARACTERISTICS

Pain severity (PEG)		5.4±2.3
Depressive symptoms (BDI-I)		17.4±11.2
Pain catastrophizing (PCS)		25.8±14.0
Psychological techniques used	Yes	68 (15.5)
	No	371 (84.5)
Self-management approaches	Yes	232 (54.3)
	No	195 (45.7)
Physical techniques used	Yes	197 (44.9)
	No	242 (55.1)
Interventional techniques used	Yes	198 (45.1)
	No	241 (54.9)
Opioid use	Yes	171 (56.4)
	No	132 (43.6)

PEG: 3-item pain severity scale measuring Pain intensity, Enjoyment of life, and General activity; BDI-I: Beck Depression Inventory-I; PCS: Pain Catastrophizing Scale;

Table 2. Distribution of patients based on low back pain diagnoses and secondary pain diagnoses

	Cervical pain	Thoracic pain	Sacral pain	Abdominal pain	Gynecologic pain	CRPS	Upper limb pain	Lower limb pain	Osteoarthritis	Headaches	Generalized syndromes
Lumbar pain without radicular pain (N = 247)	46	17	14	3	0	0	9	8	5	3	11
Lumbar pain with radicular pain (N = 373)	44	8	9	2	1	1	3	20	3	1	9
Diffuse lumbar pain (N = 66)	3	18	3	5	0	0	1	24	0	0	2

Table 3 Model fit and parameter estimates

Model fit				
		RMSEA	90% CI	
1- Basin model		0.116	0.059; 0.185	
2- Basic model + Time invariant baseline factors		0.045	0.015; 0.076	
3- Basic model + Time invariant baseline factors + Time-varying covariates		0.045	0.009; 0.074	
Parameter estimates of final model (model 3)				
	Estimates	Std. Err	z-value	p-value
Time invariant baseline factors - Intercept				
Age	0.001	0.007	-0.070	0.944
Sex (0=female, 1=male)	-0.248	0.186	-1.338	0.181
Duration	-0.006	0.009	-0.689	0.491
BDI	0.044	0.011	3.877	< 0.001
PCS	0.058	0.009	6.573	< 0.001
Time invariant baseline factors – Slope				
Age	0.004	0.005	0.829	0.407
Sex (0=female, 1=male)	-0.065	0.119	-0.549	0.583
Duration	0.001	0.006	0.010	0.992
BDI	-0.002	0.008	-0.289	0.773
PCS	-0.002	0.006	0.411	0.681
Time-varying covariates - PEG6				
Psychological approaches	-0.008	0.281	-0.028	0.978

Self-management approaches	0.105	0.234	0.450	0.653
Physical approaches	-0.007	0.227	-0.030	0.976
Interventions	-0.050	0.209	-0.238	0.812
Opioids	0.191	0.208	0.919	0.358
Time varying covariates - PEG12				
Psychological approaches	0.291	0.298	0.980	0.327
Self-management approaches	0.471	0.216	2.175	0.030
Physical approaches	-0.224	0.216	-1.038	0.299
Interventions	0.108	0.206	0.526	0.599
Opioids	0.242	0.219	1.106	0.269

Note: RMSEA: Root mean square error of approximation; CI: Confidence interval; Std. Err: Standard error; PEG6: 3-item pain severity scale measure Pain intensity, Enjoyment of life, and General activity at 6 months; PEG12: 3-item pain severity scale measure Pain intensity, Enjoyment of life, and General activity at 12 months, BDI: Beck Depression Inventory-I total score; PCS: Pain Catastrophizing Scale total score.

980 patients enrolled in QPR between 2008 and 2011 with diagnosis of LBP who signed research consent form

39 patients with pain duration < 3 months
1 patient with cancer-related pain

940 patients available for study

13 patients did not complete the baseline self-report questionnaire (e.g., too long delay or missed, questionnaires not returned, temporarily physically or cognitively unable to complete questionnaires, refused)
1 patient did not complete baseline nurse-administered questionnaire (too long delay)
9 incomplete baseline data on key variables

917 patients completed baseline questionnaires

222 patients did not complete follow-up questionnaires (e.g., not receiving treatment, too long delay or missed, questionnaires not returned, temporarily physically or cognitively unable to complete questionnaires, refused)
9 patients had missing data on key variables

686 patients included in analyses



