Original Article

JHSMR Journal of Health Science and Medical Research

A Study on Factors Affecting the Delayed Discharge of Patients With Low Back Pain: A Hospital-Based Analysis

Salinee Boonrod, B.Sc.[1], Supaporn Phadungkit, M.Sc.[2,3], Thiwaphon Chatprem, Ph.D.[2,3]

[1]Physical Therapy Department at Amnat Charoen Hospital, Mueang Amnat Charoen District, Amnat Charoen 37000, Thailand.

[2]School of Physical Therapy, Faculty of Associated Medical Sciences, Khon Kaen University, Muang District, Khon Kaen 40002, Thailand.

[3]Centre of Integrative Physical Therapy and Human Movement Sciences (CIPT-HMS), Faculty of Associated Medical Sciences, Khon Kaen University, Muang District, Khon Kaen 40002, Thailand.

Received 5 September 2024 ● Revised 13 November 2025 ● Accepted 25 December 2025 ● Published online 11 September 2026

Abstract:

Objective: While many studies have examined factors influencing return to work and prolonged sick leave in individuals with low back pain (LBP), little is known about how physical therapy management affects delayed discharge, particularly in Thailand. This study aimed to identify factors associated with delayed discharge among LBP patients receiving treatment in Thai physical therapy departments.

Material and Methods: This retrospective study analyzed data from 186 patients diagnosed with LBP. The data included patients' demographic information and the details of physical therapy interventions, which were treated as independent variables. Patients were classified into two groups: a timely discharge group and a delayed discharge group, which served as the dependent variables. Univariate and multivariate regression analysis were used to examine the association between these variables.

Results: Patients who had experienced pain >180 days and those who received >3 types of physical therapy interventions per visit were significantly more likely to have a delayed discharge, with adjusted odds ratios of 4.26 (p-value<0.0001) and 2.34 (p-value=0.002). Subgroup analysis based on the types of physical therapy interventions revealed that patients who received lumbar traction as part of their treatment were 2.53 times more likely to experience delayed discharge (p-value<0.006).

Conclusion: Receiving physical therapy >6 weeks was used to define delayed discharge in this study. This study highlights the importance of early, appropriate treatment for LBP to reduce complications and recovery time. Physical therapists should carefully evaluate the use of lumbar traction for its suitability and effectiveness.

Contact: Thiwaphon Chatprem, Ph.D.
School of Physical Therapy, Faculty of Associated Medical Sciences,
Khon Kaen University, Muang District, Khon Kaen 40002, Thailand.
E-mail: thiwch@kku.ac.th

J Health Sci Med Res
doi: 10.31584/jhsmr.20261418
www.jhsmr.org

Keywords: delayed discharge in physical therapy, early physical therapy treatment for low back pain, lumbar traction

Introduction

According to the Global Burden of Disease Study in 2020, approximately 619 million people worldwide were affected by low back pain (LBP), a significant increase of 60.4% since 1990. This number is projected to rise to an estimated 843 million by 2050, an overall increase of 73.42%. LBP has become one of the leading causes of disability globally, contributing to 70.2 million years lived with disability[1]. Beyond its considerable impact on quality of life, LBP places a significant economic burden on society, with global healthcare costs estimated at USD 134.5 billion in 2016, ranking it among the most expensive health conditions worldwide[2].

In Thailand, the Universal Coverage Scheme (UCS), commonly known as the 'Gold Card', has been in place since 2002. It has played a key role in making healthcare accessible to the majority of the population, regardless of income level, and without the need for out-of-pocket expenses. Despite its substantial benefits, the UCS has significantly impacted public health expenditure in the country[3]. In 2021, Thailand's healthcare spending totaled USD 22.5 billion, accounting for 4.5% of the Gross Domestic Product (GDP), with the public sector contributing 73.4%[4]. Forecasts suggest continued, albeit modest, growth[5].

Chronic low back pain (CLBP) ranks among the top three musculoskeletal conditions in Thailand[6,7]. It is a major contributor to disability, often disrupting daily activities and leading to extended absences from work[8,9]. In addition to the high medical costs covered by the UCS, individuals with CLBP also face indirect expenses, such as travel costs and lost income due to absenteeism[10]. These challenges not only impair physical functioning at work and in daily life but also negatively affect mental well-being[11]. Therefore, effective treatment and rehabilitation are essential to alleviate these burdens and support individuals in returning to a normal life[12].

Physical therapy is an effective intervention that provides a safer and more cost-efficient alternative to opioid use[13]. Furthermore, a systematic review reported that early access to physical therapy is associated with lower healthcare costs, reduced medication use, and a decreased need for additional expensive medical services among individuals with LBP[14,15]. However, while physical therapy offers numerous benefits, not all individuals with LBP respond successfully to this treatment. Several factors may influence treatment outcomes in patients undergoing physical therapy[16], potentially serving as barriers to successful program completion and discharge.

Previous studies have reported that higher out-of-pocket payments per visit, the use of active physical therapy interventions, and the early initiation of physical therapy relative to symptom onset are associated with fewer visits per episode of care among LBP patients[17-19]. Furthermore, a systematic review identified several factors associated with a successful return to work in patients with LBP, including lower pain intensity, higher job satisfaction, reduced reliance on active coping strategies, and the absence of pain in the cervical or thoracic spine[20,21].

In contrast, previous studies have indicated that higher therapist comfort levels, greater adherence to physical therapy, and higher baseline pain scores were respectively associated with lower rates of self-discharge and longer durations of physical therapy attendance[16,22]. Similarly, a systematic review focusing on acute LBP identified seven predictors of prolonged sick leave: high levels of disability and social isolation, older age, being female with radiating pain, increased social dysfunction, engagement in physically demanding work, and receipt of high levels of compensation[23]. Furthermore, there is evidence indicating that fear may contribute to the persistence of pain once it becomes chronic[24,25].

These factors may vary across different cultural and organizational contexts[22]. Although numerous factors have been identified as influencing recovery in individuals with LBP, the contribution of physical therapy–related factors to delayed discharge has been scarcely explored, and evidence within the Thai context is still lacking.

According to data from the Physical Therapy Department at Amnat Charoen Hospital, Thailand, LBP is the most common musculoskeletal issue. Data from patient records over an 11-month period (October 2022 to September 2023) showed that 197 patients were diagnosed with LBP. However, 192 of these patients required continued treatment. Longer treatment durations increase expenditures for the UCS, place greater demands on hospital resources, and may reduce patients' willingness to continue treatment.

Therefore, this study investigated the factors contributing to persistent pain that delay discharge among patients with LBP at the Physical Therapy Department at Amnat Charoen Hospital, Thailand. These findings aim to inform treatment strategies that shorten recovery and reduce cost, while investigating these factors across settings can guide the development of value-based services, improve patient outcomes, and optimize resource allocation for managing LBP through physical therapy.

Material and Methods

The current study has been approved by the Ethics Committee for Research Involving Human Participants at Amnat Charoen Hospital, with approval number 31/2567.

Study design and setting

The current study was a retrospective study designed to investigate the factors influencing the delayed discharge of LBP patients from the Physical Therapy Department at Amnat Charoen Hospital, Thailand.

Participants

Patients with LBP were initially examined by a physician prior to referral to the Physical Therapy Department, where a physical therapy specific diagnosis was made to ensure the implementation of an appropriate management plan. Four physical therapists, each with more than 10 years of clinical experience, provided care.

Data from LBP patients were retrospectively collected over an 11-month period (October 2022 to September 2023) by a senior physical therapist (researcher SB) with 20 years of clinical experience. During this period, 197 patients were diagnosed with LBP, of whom 192 required continued treatment. Data from six patients were incomplete, resulting in a final sample of 186 patients for further analysis (Figure 1). Anonymized patients' data were extracted from hospital records, and researcher SB subsequently tracked the number of physical therapy sessions each patient received.

Variables

On average, patients were discharged after completing 12 sessions, with treatment provided twice weekly. This corresponded to approximately six weeks of physical therapy, consistent with the findings of the systematic review conducted by Hanney et al. (2019)[15]. Nevertheless, around 59 patients (32% of those with LBP) required treatment for over six weeks, representing roughly one in three individuals with LBP.

Accordingly, the current study defined six weeks as the threshold for discharge. Patients receiving ≤6 weeks of physical therapy were categorized as the timely discharge group, while those receiving >6 weeks were classified as the delayed discharge group. This classification was used as the dependent variable. The independent variables were obtained from patient demographic data and information regarding physical therapy interventions.

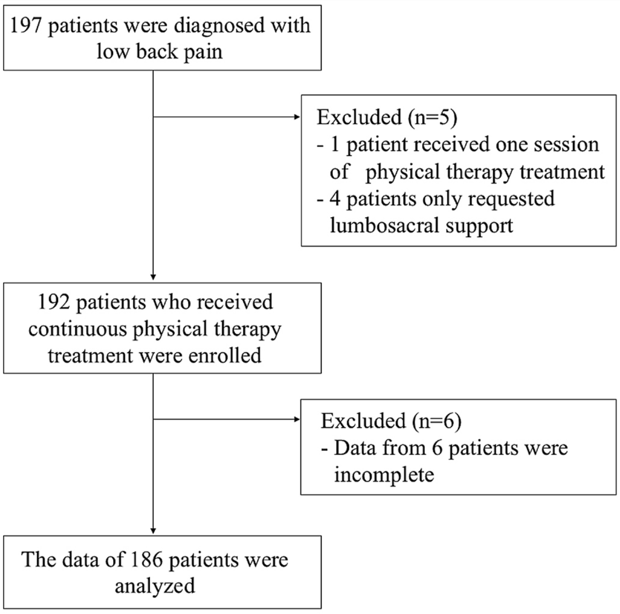

Figure 1 Study flow diagram

Statistical analysis

Data analysis was conducted using STATA version 18 (StataCorp LP, College Station, TX, USA). Continuous variables were presented as means and standard deviations, while categorical variables were reported as frequencies and percentages. Differences in baseline characteristics between groups were analyzed using the Chi-square or Fisher's exact test, depending on the underlying assumption, with a p-value<0.05 considered statistically significant. The dependent variable was discharge status, categorized as timely or delayed, as described previously.

All independent variables were transformed into dummy variables using a data-driven internal classification based on their mean or median value for inclusion in the regression model. However, occupations were classified according to the International Standard Classification of Occupations (ISCO) and divided into two groups based on physical demand. Univariate analysis was used to explore the relationship between various factors and dependent variables, with results reported as odds ratios (ORs) and 95% confidence intervals (CIs), using a significance threshold of p-value<0.2. Factors with a p-value<0.2 were then included in the multivariate regression analysis. A p-value of less than 0.05 was considered statistically significant, and significant predictors were reported as adjusted odds ratios (AORs). The relationship between the type of physical therapy interventions (modalities, passive interventions, and active interventions) and the dependent variable was examined in a separate regression model.

Results

Baseline characteristics of study patients

A total of 186 patients with LBP were included in the study. Of these, 127 patients were classified as the timely discharge group, while 59 were categorized as the delayed discharge group, using six weeks as the cut-off. The demographic characteristics of both groups are presented in Table 1.

The study found that most LBP patients were female, typically married, and engaged in basic occupations such as farming, cleaning, or manual labor. Most had no medical condition status. The three most common diagnoses were nonspecific LBP (27.41%), spondylosis (22.04%), and herniated nucleus pulposus (HNP) (19.35%), categorized according to the International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10).

The average duration of pain was 192.29±454.72 days. Most patients received medication (83.33%), including pain relievers (75%), muscle relaxants (26%), vitamins (26%), and topical ointments (25%). The commonly used physical therapy interventions were hot packs (99.46%), shortwave diathermy (SWD) (70.96%), and stretching exercises (69.53%). They are presented as the frequency of participants who received each intervention in each group. Patients generally did not use lumbosacral support (LS support). The majority were covered under the Universal Coverage Scheme (UCS).

Table 1 Demographics characteristics of 186 participants (value represents number shown as percentage unless otherwise indicated)

Variables	Timely discharge group (n=127)	Delayed discharge group (n=59)	p-value
Gender			0.50
Male	46 (36.22)	22 (37.29)	
Female	81 (63.78)	37 (62.71)	
Age (years), (Mean±S.D.)	56.24±13.63	54.39±13.60	0.38
BMI (Kg/m^2), (Mean±S.D.)	24.02±3.45	24.01±3.74	0.98
Occupation			0.39
Unemployed	27 (21.26)	14 (23.74)	
Traders	19 (14.96)	7 (11.86)	
Government officer	27 (21.26)	19 (32.20)	
Craftsman	2 (1.58)	0 (0)	
Workman	52 (40.94)	19 (32.20)	
Married status			0.56
Single	18 (14.17)	10 (16.95)	
Married	107 (84.25)	49 (83.05)	
Widow	2 (1.58)	0 (0)	
Physical therapy diagnosis			0.14
Stenosis	15 (11.80)	8 (13.56)	
Herniated nucleus pulposus	21 (16.53)	15 (25.43)	
Spondylosis	29 (22.83)	12 (20.34)	
Spondylolisthesis	1 (0.8)	2 (3.39)	
Nonspecific LBP	34 (26.76)	17 (28.82)	
Muscle strain	21 (16.53)	1 (1.69)	
Scoliosis	1 (0.8)	1 (1.69)	
Back pain with sciatic	4 (3.15)	3 (5.08)	
Tuberculosis spine	1 (0.8)	0 (0)	
Medical condition status			0.003*
Yes	53 (41.73)	33 (55.93)	
No	74 (58.27)	26 (44.07)	
Drug use			0.01*
Yes	112 (88.19)	43 (72.88)	
No	15 (11.81)	16 (27.12)	
Type of physical therapy intervention			0.09
Hot pack	126 (30.88)	59 (30.41)	
Shortwave diathermy	91 (22.30)	41 (21.14)	
Electrical stimulation	24 (5.88)	17 (8.76)	
Ultrasound	9 (2.21)	6 (3.09)	
Laser	8 (1.96)	6 (3.09)	
Traction	27 (6.62)	24 (12.37)	
Mobilization	18 (4.41)	9 (4.64)	
Stretching	100 (24.51)	29 (14.95)	
Strengthening	5 (1.23)	3 (1.55)	
Lumbosacral support use			0.12
Yes	30 (23.62)	8 (13.56)	
No	97 (76.38)	51 (86.44)	
Pain duration (days)	146.93±429.69	289.93±494.19	0.04*
Treatment eligibility			0.49
Universal coverage scheme	75 (59.06)	32 (54.24)	
Social security scheme	15 (11.81)	5 (8.47)	
Civil servant	37 (29.13)	22 (37.29)	

Continuous variables were analyzed using the t-test. Categorical variables gender, underlying medical conditions, and drug use were analyzed using Fisher's exact test, while other categorical variables were analyzed using the Chi-square test. *p-value<0.05., S.D.=standard deviation, BMI=body mass index

Delayed discharge and associated factors

Nine factors were obtained from the participants' data: gender, body mass index (BMI), marital status, occupation, medical condition status, drug use, number of types of physical therapy intervention received per visit, use of lumbosacral support, and duration of pain. Results from the univariate regression analyses are presented in Table 2. Four factors were associated with a p-value of <0.2: presence of a medical condition status, drug use, receiving more than three types of physical therapy intervention per visit, and pain duration exceeding 180 days. Then, four factors were entered for the initial model of multivariate logistic regression. The backward stepwise technique was used to eliminate the variables with a set p-value of <0.05. The multivariate regression analysis showed that two factors were associated with delayed discharge. They were pain duration exceeding 180 days (p-value<0.0001) and received more than three types of physical therapy intervention per visit (p-value=0.02) (Table 2).

Discussion

To the best of our knowledge, this is the first study in Thailand to specifically examine factors contributing to delayed discharge from physical therapy, using six weeks

Table 2 Association factors of delayed discharge among fifty-nine participants with LBP

Factors	Delayed discharge	
	Crude OR ratio (95%CI)	Adjusted OR ratio (95%CI)
Gender		
Male	1	-
Female	1.04 (0.55 to 1.98)	
BMI (Kg/m^2)		
<25	1	-
≥25	0.99 (0.53 to 1.85)	
Occupation		
Unemployed/traders/government officer	1	-
Craftsman/workman	0.75 (0.40 to 1.42)	
Married status		
Single/widow	1	-
Married	0.78 (0.35 to 1.74)	
Medical condition status		
No	1	-
Yes	1.77 (0.95 to 3.30)*	
Drug use		
No	1	1
Yes	0.35 (0.16 to 0.79)*	0.56 (0.23 to 1.35)
Number of types of physical therapy intervention received per visit		
≤3	1	1
>3	2.15 (1.08 to 4.26)*	2.37 (1.14 to 4.89)**
Lumbosacral support usage		
No	1	-
Yes	0.53 (0.22 to 1.24)	
Pain duration (days)		
<180	1	1
≥180	4.02 (2.02 to 8.01)*	4.26 (2.10 to 8.62)**

*p-value<0.20, **p-value<0.05, LBP=low back pain, OR=odds ratio, 95% CI=95% confidence interval as the reference cut-off point. This timeframe corresponds to the typical duration for discharge or referral following physical therapy[15].

The current study included nine variables and 187 participants, which provided adequate statistical power for the analysis, as evidence suggests that at least 10 events per variable are required for multiple logistic regression analysis[26]. The study found that patients requiring a longer duration of treatment (delayed discharge group) had an average pain duration of 289 days, or approximately 9 months, indicating a chronic stage of pain. In this study, a threshold of 180 days was used to define chronic pain for patients' classification. Patients with pain lasting longer than 180 days were 4.26 times more likely to undergo physical therapy beyond the average treatment duration

Although pain can affect patients at any stage of LBP, previous studies have concluded that the chronic stage tends to involve increased pain intensity and a larger pain area compared to subacute LBP[27,28]. This is supported by Paatelma et al.'s study (2009), which found that individuals with chronic pain exhibited greater pain sensitivity when assessed using pain provocation tests and specific movement assessments[29].

Emotional stress is another factor for the differences in severity between acute and chronic pain. Numerous studies have shown that chronic pain is associated with higher levels of emotional stress, particularly depression, compared to the acute stage[28,30,31]. Along with fear-avoidance behaviors, emotional stress may play a crucial role in exacerbating the impact of chronic pain[32]. These findings suggest that the progression of LBP to a chronic condition is strongly linked to significant psychosocial impairments, which can disrupt daily functioning and compromise emotional well-being[33].

A study investigated muscle function among healthy individuals and those with acute and chronic LBP. The results showed that individuals with CLBP had lower activation of the multifidus muscle compared to healthy individuals. However, no significant differences were observed in the acute stage[34]. This alternation in CLBP may be attributed to long-loop inhibition of the multifidus, combined with reflex inhibition[35]. Persistence of this mechanism could result in selective atrophy of the multifidus[34,35], which may contribute to the high recurrence rate of LBP[34].

The reasons outlined above help explain the differences between the acute and chronic stages of LBP. While the duration of the condition is the most apparent distinction between the two groups, a closer examination reveals several additional differences, including pain sensitivity, the distribution of pain, emotional well-being, and deterioration of the deep trunk muscles. These differences support our finding that patients with chronic pain were 4.26 times more likely to experience delayed discharge, highlighting the challenges physical therapists face in managing individuals at the chronic stage, who may become dependent on treatment and more reluctant to discontinue physical therapy[36].

Another factor identified in the current study was receiving more than three types of physical therapy intervention per visit, with these patients being 2.37 times more likely to experience delayed discharge. One possible explanation supporting this finding is that these patients may have presented with more complex symptoms, for which one or two treatment modalities were insufficient to provide relief. Unfortunately, our dataset did not include information on the functional limitations or pain levels. To address this limitation, we conducted a subgroup analysis to provide clearer insights.

From the subgroup analysis focusing on the type of physical therapy intervention, it was found that patients who received traction were significantly associated with delayed discharge; the odds ratio was 2.53 (95% CI=1.29 to 4.96), p-values of 0.006. Traction is typically indicated as a treatment modality when the signs and symptoms are known to be caused by disc herniation and nerve root impingement, particularly when these symptoms are aggravated by joint loading and relieved by distraction or unloading. In such cases, traction may help reduce or control symptoms. However, it is less likely to be effective when a large disc herniation protrudes into the spinal canal or when the herniated or protruding disc material has become calcified[37].

A Cochrane Collaboration systematic review in 2013, which analyzed 32 randomized controlled trials (RCTs), concluded that traction, whether used alone or in combination with other treatments, has minimal or no effect on pain intensity, functional status, overall improvement, or return to work in individuals with LBP[38]. Additionally, the study in 120 patients with LBP and nerve root symptoms found no significant difference in outcomes between those treated with extension-oriented therapy alone and those who received the same therapy combined with mechanical traction[39]. Despite the lack of strong evidence supporting the effectiveness of lumbar traction, it continues to be used and recommended for certain patients with symptoms attributed to lumbar spine disorders[37].

The use of traction has particular indications and precautions related to patient signs and symptoms. Thus, physical therapists should carefully follow the standard criteria when applying this modality and regularly reassess patient progress, as LBP patients who received traction as part of their treatment were 2.37 times more likely to experience delayed discharge. Moreover, lumbar instability is a precaution that should be given careful consideration, as high-force traction may further increase mobility in the affected area.

Although the present study provides valuable clinical insights, several limitations should be acknowledged. First, the retrospective design may have precluded the inclusion of certain relevant factors, such as pain intensity, functional capacity, and psychosocial variables. Second, as the study was conducted within a single physical therapy department, the generalizability of the findings to other settings may be limited.

Conclusion

Our results are consistent with previous studies suggesting that chronicity is associated with delayed discharge, potentially due to alterations in both physical and mental status. Additionally, our findings both support and contradict prior studies regarding the relationship between traction and delayed discharge. These observations underscore important considerations for both patients with LBP and physical therapists. First, early initiation of physical therapy may facilitate faster recovery, potentially reducing the number of consultations and overall healthcare costs. Second, the use of traction should be guided by careful clinical judgment and applied with caution.

Acknowledgement

The authors would like to express their sincere gratitude to the low back pain patients who received physical therapy at Amnat Charoen Hospital, Amnat Charoen, Thailand, for allowing us to use their information. We also extend our thanks to all the physical therapists at Amnat Charoen Hospital for providing access to their treatment data.

Conflict of interest

There are no potential conflicts of interest to declare.

Funding sources

The current study has no funding support.

References

1. Ferreira ML, Luca K De, Haile LM, Steinmetz JD, Culbreth GT, Cross M, et al. Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. The Lancet Rheumatology 2023;5:e316-29. doi: 10.1016/S2665-9913(23)00098-X.
2. Dieleman JL, Cao J, Chapin A, Chen C. Us health care spending by payer and health condition, 1996-2016. JAMA 2020;323:863-84. doi: 10.1001/jama.2020.0734.

3. Jindapol N, Kunupatham P, Theerasilp P, Kitikannakorn N. Crisis of health insurance under Thai civil servant medical benefit scheme (CSMBS). Srinagarind Med J 2014 ;29:199-206.
4. Laikram S, Thummanitchayuth D, Buangern N, Pluemjai P. Analysis of the inequality of healthcare rights in thailand. J of Acad Surindra Rajabhat 2025;3:183-94.
5. Weraphong J, Pannarunothai S, Luxananun T, Junsri N, S Deesawatsripetch. Catastrophic heath expenditure in an urban city: seven years after universal coverage policy in Thailand. Southeast Asian J trop Med public health 2013;44:124-36.
6. Phoonjaroen P, Utaiwattana N, Thawisuk C. Ergonomic risks and musculoskeletal pain among office workers in a healthcare setting: a cross-sectional study. Siriraj Med J 2025;77:446-55. doi: 10.33192/smj.v77i6.272161.
7. Luangwilai TL, Sumanasrethakul C, Supawattanabodee B, Chaichan C, Wanichnopparat W, Kunno J. Musculoskeletal disorders among medical school staff in an urban tertiary care academic hospital in thailand. Vajira Med J 2025;69:e271635. doi: 10.62691/vmj.2024.271635.
8. Lidgren L. The bone and joint decade 2000-2010. Bull World Health Organ 2003;81:629.
9. Airaksinen O, Brox JI, Cedraschi C, Hildebrandt J, Klaber-Moffett J, Kovacs F, et al. Chapter 4. European guidelines for the management of chronic nonspecific low back pain. Eur Spine J 2006;15: S192-300. doi: 10.1007/s00586-006-1072-1.
10. Becker A, Held H, Redaelli M. Low back pain in primary care: costs of care and prediction of future health care utilization. Spine 2010;35:1714–20. doi: 10.1097/brs.0b013e3181cd656f.
11. Hammill RR, Beazell JR, Hart JM. Neuromuscular consequences of low back pain and core dysfunction. Clin Sports Med 2008; 27:449-62, ix. doi: 10.1016/j.csm.2008.02.005.
12. Essman M, Lin CY. The role of exercise in treating low back pain. Curr Sports Med Rep 2022;21:267-71. doi: 10.1249/JSR.0000000000000982.
13. Skell AC, Chou R, Dettori RJ, Turner JA, Friedly JL, Rundell SD, et al. Noninvasive nonpharmacological treatment for chronic pain: a systematic review update. Rockville, MD: Agency for Healthcare Research and Quality; 2020.
14. Frogner BK, Harwood K, Andrilla CHA, Schwartz M, Pines JM. Physical therapy as the first point of care to treat low back pain: instrumental variables approach to estimate impact on opioid prescription, health care utilization, and cost. Health Serv Res 2018;53:4629-46. doi: 10.1111/1475-6773.12984.
15. Hanney WJ, Masaracchio M, Lui X, Kolber M. The influence of physical therapy guideline adherence among patients with low back pain: a systematic review of literature. PLoS One 2016; 11:e0156799. doi: 10.1371/journal.pone.0156799.
16. Balinski M, Blanchard L, Mendoza R, Zaranec M, Duncombe A, Madhavan S. Factors associated with physical therapy attendance rate and self-discharge in people with chronic pain. JOSPT Open 2024 2:4, 332-9. doi: 10.2519/josptopen.2024.1136.
17. Dolot J, Hyland M, Shi Q, Kim HY, Viola D, Hoekstra C. Factors impacting physical therapy utilization for patients with nonspecific low back pain: retrospective analysis of a clinical data set. Phys Ther 2020;100:1502-15. doi: 10.1093/ptj/pzaa082.
18. Fritz JM, Cleland JA, Speckman M, Brennan GP, Hunter SJ. Physical therapy for acute low back pain: associations with subsequent healthcare costs. Spine (Phila Pa 1976). 2008; 33:1800-5. doi: 10.1097/BRS.0b013e31817bd853.
19. Childs JD, Fritz JM, Wu SS, Flynn TW, Wainner RS, Robertson EK, Kim FS, George SZ. Implications of early and guideline adherent physical therapy for low back pain on utilization and costs. BMC Health Serv Res 2015;15:150. doi: 10.1186/s12913-015-0830-3.
20. Hulst M, Vollenbroek-Hutten MM, Ijzerman MJ. A systematic review of sociodemographic, physical, and psychological predictors of multidisciplinary rehabilitation-or, back school treatment outcome in patients with chronic low back pain. Spine (Phila Pa 1976). 2005;30:813-25. doi: 10.1097/01.brs.0000157414.47713.78.
21. Kuijer W, Groothoff JW, Brouwer S, Geertzen JH, Dijkstra PU. Prediction of sickness absence in patients with chronic low back pain: a systematic review. J Occup Rehabil 2006;16:439-67. doi: 10.1007/s10926-006-9021-8.
22. Alimam DM, Alqarni MJ, Aljohani MH, Alqarni MA, Alsubiheen AM, Alrushud AS. Key factors driving physiotherapy use in patients with nonspecific low back pain: retrospective clinical data analysis. J Clin Med 2024;13:6261. doi: 10.3390/jcm13206261.
23. Steenstra IA, Verbeek JH, Heymans MW, Bongers PM. Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: a systematic review of the

literature. Occup Environ Med 2005;62:851-60. doi: 10.1136/oem.2004.015842.

24. George SZ, Fritz JM, McNeil DW. Fear-avoidance beliefs as measured by the fear-avoidance beliefs questionnaire: change in fear-avoidance beliefs questionnaire is predictive of change in self-report of disability and pain intensity for patients with acute low back pain. Clin J Pain 2006;22:197-203. doi: 10.1097/01.ajp.0000148627.92498.54.
25. George SZ, Fritz JM, Childs JD. Investigation of elevated fear-avoidance beliefs for patients with low back pain: a secondary analysis involving patients enrolled in physical therapy clinical trials. J Orthop Sports Phys Ther 2008;38:50-8. doi: 10.2519/jospt.2008.2647.
26. Peduzzi P, Concato J, Kemper E, Holford TR, Feinstein AR. A situlation study of the number of events per variable in logistic regression analysis. J Clin Epidemiol 1996;49:1373-9. doi: 10.1016/S0895-4356(96)00236-3.
27. Watkins EA, Wollan PC, Melton LJ 3rd, Yawn BP. A population in pain: report from the Olmsted County health study. Pain Med. 2008;9:166-74. doi: 10.1111/j.1526-4637.2007.00280.x.
28. Chanda ML, Alvin MD, Schnitzer TJ, Apkarian AV. Pain characteristic differences between subacute and chronic back pain. J Pain 2011;12:792-800. doi: 10.1016/j.jpain. 2011.01.008.
29. Paatelma M, Karvonen E, Heiskanen J. Clinical perspective: how do clinical test results differentiate chronic and subacute low back pain patients from "non-patients"? J Man Manip Ther. 2009;17:11-9. doi: 10.1179/106698109790818197.
30. Poole H, Bramwell R, Murphy P. Factor structure of the Beck depression inventory-II in patients with chronic pain. Clin J Pain 2006;22:790-8. doi: 10.1097/01.ajp.0000210930.20322.93.
31. Harris CA, D'Eon JL. Psychometric properties of the Beck Depression Inventory-second edition (BDI-II) in individuals with chronic pain. Pain 2008;137:609-22. doi: 10.1016/j.pain.2007.10.022.
32. Richardson C, Hodges PW, Hides J. Therapeutic exercise for lumbopelvic stabilization: a motor control approach for the treatment and prevention of low back pain. 2nd ed. China: Elsevier; 2004.
33. Gatchel RJ, Bernstein D, Stowell AW, Pransky G. Psychosocial differences between high-risk acute vs. chronic low back pain patients. Pain Pract 2008;8:91-7. doi: 10.1111/j.1533-2500.2008.00176.x.
34. Danneels LA, Coorevits PL, Cools AM, Vanderstraeten GG, Cambier DC, Witvrouw EE, et al. Differences in electromyographic activity in the multifidus muscle and the iliocostalis lumborum between healthy subjects and patients with sub-acute and chronic low back pain. Eur Spine J 2002;11:13-9. doi: 10.1007/s005860100314.
35. Adams MA, Bogduk N, Burton K, Dolan P. The biomechanics of back pain third edition. China: Elsevier; 2013.
36. Pashley E, Powers A, McNamee N, Buivids R, Piccinin J, Gibson BE. Discharge from outpatient orthopaedic physiotherapy: a qualitative descriptive study of physiotherapists' practices. Physiother Can 2010;62:224-34. doi: 10.3138/physio.62.3.224.
37. Cameron MH. Physical agents in rehabilitation: an evidence-based approach to practice. 6th ed. India: Elsevier; 2023.
38. Wegner I, Widyahening IS, Tulder MW van, Blomberg SE, Vet HC de, Brønfort G,et al. Traction for low-back pain with or without sciatica. Cochrane Database Syst Rev 2013;8:CD003010. doi: 10.1002/14651858.CD003010.pub5.
39. Thackeray A, Fritz JM, Childs JD, Brennan GP. The effectiveness of mechanical traction among subgroups of patients with low back pain and leg pain: a randomized trial. J Orthop Sports Phys Ther 2016; 46:144-54. doi: 10.2519/jospt.2016.6238.