



Observational study

Pain-related factors associated with lost work days in nurses with low back pain: A cross-sectional study

Saurab Sharma^{a,*,1}, Nischal Shrestha^b, Mark P. Jensen^c^a Department of Physiotherapy, Kathmandu University School of Medical Sciences, Dhulikhel, Nepal^b Department of Physiotherapy, Dhulikhel Hospital Kathmandu University Hospital, Dhulikhel, Nepal^c Department of Rehabilitation Medicine, University of Washington, Seattle, WA, USA

H I G H L I G H T S

- Low back pain (LBP) a leading cause of disability and lost work days (LWDs).
- LWDs in nurses can lead to staff shortages – jeopardizing optimal patient care.
- Presence of constant pain and pain alleviated by rest are associated with LWDs.
- Severity of low back pain is only weakly associated with LWDs in nurses.
- LBP treatment may need to focus on more than just reduction of pain intensity.

A R T I C L E I N F O

Article history:

Received 31 July 2015

Received in revised form 9 October 2015

Accepted 13 November 2015

Available online 17 December 2015

Keywords:

Constant pain
Health Personnel
Nursing
Passive coping
Sick leave
Sickness absence

A B S T R A C T

Background and aims: Chronic low back pain is known to contribute to lost work days (LWDs) in nurses. However, there is a limited understanding of the factors that moderate the impact of low back pain (LBP) on LWDs – in particular factors that are modifiable and that could therefore be the treatment targets of interventions designed to help nurses more effectively manage LBP.

This study aims to identify pain-related factors that are associated with LWDs in nurses with LBP, in order to inform the development of interventions that could reduce LBP-related work dysfunction and improve patient care.

Methods: A cross sectional study was conducted on 111 female nurses who were asked to answer questions regarding demographic information, work history, presence or absence of LBP, number of LWDs due to illness, and a number of factors that could potentially be related to LWDs including: (1) average and worst pain intensity; (2) the temporal pattern of LBP (constant versus intermittent); (3) pain aggravating factors (lifting, bending, walking, and standing); and (4) pain alleviating factors (medications, rest, exercise).

Results: Sixty-five percent ($n = 72$) of the sample reported LBP. Constancy of pain and having a LBP problem that was alleviated by rest were significantly associated with the number of LWDs, while maximum and average LBP intensity were only weakly associated.

Conclusion: The findings provide important new information regarding what is (and of equal importance) what is not associated with LWDs in nurses with LBP.

Implications: To effectively reduce LBP-related work disability, interventions may need to teach nurses how to better manage constant pain and remain active despite pain, rather than focus on pain reduction. Research to examine the potential efficacy of such treatment approaches for nurses with LBP is warranted.

© 2015 Scandinavian Association for the Study of Pain. Published by Elsevier B.V. All rights reserved.

1. Introduction

Low back pain (LBP) is one of the most common causes of disability and sixth in overall burden among all health conditions, based on the 2010 Global Burden of Disease study [1]. LBP is particularly prevalent among nurses [2], ranging from 61% to 84% around the world [2–6]. LBP in nurses is also associated with reduced

DOI of refers to article: <http://dx.doi.org/10.1016/j.sjpain.2016.01.005>.

* Corresponding author at: Department of Physiotherapy, Kathmandu University School of Medical Sciences, Dhulikhel Hospital Kathmandu University Hospital, P.O. Box No. 11008, Dhulikhel, Nepal. Tel.: +977 9841634043; fax: +977 1 490707.

E-mail address: saurabsharma@kusms.ku.edu.np (S. Sharma).¹ Saurab Sharma (link.physio).

efficiency at work and early retirement [5]. LBP is associated with professions that require bending or twisting [7], manual lifting [8], working in awkward postures [9] or high levels of psychological stress [10]. LBP is also more common among women than men [11,12]. These factors may help explain why nurses are at a high risk to develop LBP, as this is a profession that tends to have a higher percentage of women and involves a great deal of manual lifting [13].

LWDs is a major public health and economic problem and in nurses leads to shortage of staff at work which can jeopardize optimal patient care [14]. LWDs has been shown to be associated with trunk bending and rotation, lifting activities at work, low job satisfaction and high levels of work load [15]. Physical fatigue has also been shown to be associated with LWDs among nurses. For new nurses psychological support and supervision at work can reduce the number of LWDs [16].

Various factors are known to have association with LWDs in nurses. Among those that are known, work overload, psychological job demand, organizational and social work factors such as night shift, perceived lack of support from seniors, and perceived lack of relaxing or supporting and encouraging culture in the work unit have been found to be associated with LWDs among nurses [16–18]. Despite the research that has identified psychosocial factors associated with LWDs in nurses in general, there remains a great deal that is not known about the LBP-related factors that contribute to work absence in this population. For example, although it might be assumed that overall pain severity might play a role, we do not know how important LBP intensity may be as a predictor of work absence, relative to other factors. In addition, if pain intensity is found to be important, we do not yet know *which* intensity domains are most important to work dysfunction (e.g., average versus worst pain). We also do not yet know the relative importance of temporal characteristics of pain (e.g., intermittent versus constant pain) as it may be related to LWDs, nor do we know the extent to which factors that are thought to exacerbate LBP (e.g., lifting, bending, walking, or standing) or that might alleviate LBP (e.g., resting, medications, exercise or any other factors) are associated with work dysfunction. Information regarding the characteristics of LBP most closely associated with LWDs is needed to develop more effective interventions that could determine both (1) who might benefit most from interventions designed to reduce the impact of LBP on work dysfunction and (2) the factors that should be targeted in treatment.

To address these knowledge gaps, we aimed to assess the incidence of LBP, number of LWDs in the past year, and the presence, severity, and temporal pattern of LBP in a sample of nurses working in a tertiary care hospital in Nepal. For those reporting LBP, we also assessed the factors that made their LBP worse and that alleviated their LBP. We predicted that LBP would have high incidence among the nurses in our sample (i.e., somewhere between 61% and 84%) consistent with previous research. We also predicted that, among the nurse participants with LBP, those who (1) reported higher level of pain intensity, (2) reported having constant (instead of intermittent) pain, and (3) reported that pain was worsened by the physical activities involved in nursing work (e.g., lifting, bending, walking, and standing) would report more LWDs. Finally, and based on biopsychosocial models arguing that passive coping responses to pain contribute to greater disability [19–21], we predicted that participants who reported that rest and medications alleviated their pain, and who did not endorse exercise as a coping response that alleviated their pain, would report more LWDs. Understanding the factors that contribute to lost work days (LWDs) among nurses – in particular modifiable factors – is important, because it could inform the development of interventions that could reduce the impact of LBP on work-related disability.

2. Methods

2.1. Participants and methods

The study participants were nurses working in Dhulikhel Hospital, Nepal. Participants were required to be working full-time (7 h shift at least five times a week) as a nurse at the hospital for the inclusion in the study. Exclusion criteria included (1) being pregnant or (2) reporting a history of any trauma or medical illnesses that can contribute to LBP. To recruit the participants, the investigators obtained information regarding the work locations of different nurses within the hospital, and a research assistant went to each location and invited to participate. Those who agreed to participate completed the measures (described below) at the time of study consent or were given the questionnaires to complete at another time. Those who did not complete the survey at the time of consent were contacted again one week later, and asked to provide the completed survey, if they had completed it in the meantime. In all, 127 nurses were approached, and 111 (87%) agreed to participate. The study procedures were approved by the Institutional Review Committee of Kathmandu University School of Medical Sciences, Dhulikhel Hospital, Nepal (reference number 75/14) and all participants provided informed consent prior to completing the study measures. Data were collected from September to December 2014.

2.2. Measures

2.2.1. Demographic and descriptive variables

All study participants were asked to provide demographic information (sex, educational level), work history (years of experience in nursing, duration of work every week, usual work shift [i.e., day versus night shift], and work setting [out-patient versus in-patient departments]), and presence or absence of LBP.

2.2.2. Pain variables

All participants were asked to indicate whether or not they experienced LBP in the past year. Those participants who indicated that they had LBP were then asked to rate their average pain in most of the days and worst pain intensity in the past week on 0–10 Numerical Rating Scales (NRS), with 0 = “No pain” and 10 = “Worst imaginable pain”. A great deal of evidence supports the reliability and validity of such scales as accurate estimates of actual average and worst pain intensity [22].

The participants were also asked to indicate whether or not their LBP was constant or intermittent. Next, they were asked to indicate whether or not one of four physical activities associated with the job of nursing made their pain worse; that is, if their pain was or was not made worse by lifting, bending, walking, and standing. They were also allowed to indicate if there was or were any other factor or factors that made their pain worse not on this list, and to indicate what that factor was (or what those factors were). They were asked to indicate whether or not three factors alleviated their LBP: rest, medications, or exercise. They were also allowed to indicate if there was any other factor or factors that alleviated their LBP, and to indicate what that factor was (or what those factors were).

2.2.3. Number of LWDs due to illness

All participants who reported LBP were asked to indicate the number of days they were unable to work in the last year because of illness (i.e., the reason could be LBP or any other illness). The participants were not required to be experiencing pain at the time they responded to the survey in order to participate in the study.

2.3. Data analyses

We first computed descriptive statistics for the demographic and study variables to describe the sample and test the first hypothesis regarding the incidence of LBP in the sample. We then examined the distributions of the continuous study variables (assessing pain intensity and number of LWDs). If the study variables were normally distributed, we then tested the hypothesized associations of LWDs with pain intensity, presence of LBP, constancy of pain, pain aggravating factors, and pain alleviating factors. We computed Pearson's correlation coefficients for association of LWDs with continuous predictors (worst and average pain intensities) and a series of *t*-tests for categorical predictors (presence of LBP, constancy of LBP, aggravating and alleviating factors). Finally, to identify the factors that contributed to number of LWDs due to illness over and above pain intensity, we performed a regression analysis with number of LWDs as the criterion variable. We entered the two pain intensity variables assessing average and worst pain in the first step, and any factors that were found to be significantly associated with LWDs in the univariate analyses in the second step. All analyses were performed using the Statistical Package for Social Sciences, version 16 (SPSS Inc., Chicago, IL).

3. Results

3.1. Description of the sample and study variables

Descriptive information for the study sample is presented in Table 1. As can be seen, all of the participants (100%) were women (consistent with nursing being viewed as a "female gender profession" in Nepal [23]). Age range was 19–40 years, with mean age of 24.31 ± 3.7 SD years.

Table 1
Description of the sample.

Variable	N (%)
Sex	
Women	111 (100%)
Marital status	
Married	34 (31%)
Unmarried	77 (69%)
Clinical experience	
Less than 1 year	43 (39%)
2–5 years	53 (48%)
6–10 years	10 (9%)
More than 10 years	5 (4%)
Education	
Staff nurse	79 (71%)
Midwife	14 (13%)
Bachelor of Nursing	17 (15%)
Master of Nursing	1 (1%)
Department	
Inpatient	96 (87%)
Outpatient	15 (13%)
Shift	
Night	20 (18%)
Day	28 (25%)
Both	63 (57%)
Presence of LBP?	
Yes	72 (65%)
No	39 (35%)
What makes LBP worse?	
Lifting	35 (31%)
Bending	33 (30%)
Walking	16 (14%)
Prolonged standing	52 (47%)
What alleviates LBP?	
Medication	8 (7%)
Exercises	10 (9%)
Resting	66 (60%)
Continuous pain	16 (14%)

The mean (and SD) number of LWDs in the sample was 6.98 (5.33). The mean maximum pain intensity in the last week was 5.1 (SD = 1.73; range = 0–10; skewness = 0.13), and the mean average pain intensity in the last week was 4.06 (SD = 1.61, range = 0–9, skewness = 0.14).

3.2. Incidence of LBP and association of LBP with number of LWDs due to illness

Sixty-five percent ($n = 72$) of the sample reported that they had LBP. The average number of LWDs was 6.98 (SD = 5.33), and ranged from 0 to 14.

3.3. Univariate predictors of LWDs

The distribution of the study variables (number of LWDs, the 0–10 ratings of maximum pain in the last week, and the 0–10 ratings of average pain in the most days) were all reasonably normal (i.e., skewness = 1.27, 0.13, and 0.14, and kurtosis = 0.22, 1.03, and 0.61, respectively). The zero-order Pearson correlation coefficients between maximum pain intensity in the last week and average LBP intensity ratings in most days and LWDs were 0.12 and 0.14 (both $ps = NS$), respectively, indicating weak and non-significant associations between these variables.

The results of the univariate *t*-tests comparing the number of LWDs in those reporting and not reporting (1) constant pain, (2) that pain was worsened (or not) with lifting, bending, walking, and standing, and (3) that rest, medications, or exercise alleviated pain, yielded two statistically significant associations. Specifically, those with constant pain reported more LWDs (mean = 7.69, SD = 5.68) than those who did not endorse having constant pain (mean = 4.29, SD = 5.27; $t(70) = 2.24$, $p = .028$). Also, those reporting that "rest" alleviated their LBP reported more LWDs (mean = 5.54, SD = 5.57) than those who did not say that rest alleviated their pain (mean = 0.43, SD = 0.79; $t(70) = 2.41$, $p = .019$). Participants did not report any other pain aggravating or alleviating factors, suggesting that the options provided adequately covered the universe of most common factors.

3.4. Multivariate predictors of LWDs

The results of the regression analysis predicting number of LWDs from the two significant univariate predictors (constancy of pain, rest as an alleviating factor), controlling for pain intensity, are presented in Table 2. As can be seen, and consistent with the univariate analyses, pain intensity did not contribute significantly to the prediction of variance in LWDs. The step that included the two factors that were significant in the univariate analyses was statistically significant ($p = .009$), although together these variables only accounted for 13% of the variance in LWDs. When the two were entered together, only having a pain problem alleviated by rest made a statistically significant unique contribution to the prediction of LWDs.

Table 2
Regression model predicting number of sick days from constancy of pain and rest as a pain alleviating factor, controlling for maximum and average pain intensity.

Step: predictor variable	$R^2 \Delta$	F ($R^2 \Delta$)	β	<i>t</i>	<i>p</i>
Step 1: Pain intensity	.02	0.72			.490
Maximum pain intensity			.04	0.21	.834
Average pain intensity			.12	0.65	.520
Step 2: Pain factors	.13	5.04			.009
Pain constancy			-.25	1.88	.064
Rest alleviates pain			.30	2.45	.017

4. Discussion

We found that the incidence of LBP among nurses working in a Nepalese hospital (Dhulikhel Hospital, about 30 km from Kathmandu, Nepal), all of whom were women, is 65%. This replicates the common finding that LBP is a highly prevalent problem among nurses, and supports LBP in nurses as a worldwide problem. We did find, however, that the prevalence of LBP in our sample was towards the end of the range commonly reported in the literature as a whole. This could be due to the relative youth of the sample; the nurse participants in the current study had average age of 24 years, and the majority had less than five years of experience. Previous studies that reported higher prevalence rates had participants who were older than those in our sample [4–6]. For example, Ouyolu et al. found a prevalence rate 84%, while only 13% of the sample was aged less than 25 years. Similarly, Lin and colleagues and Sikiru and Hanifa reported prevalence rates of 82% and 73%, with mean age of nurses 31 and 39 years, respectively.

However, age may not be the only factor that influences the LBP in nurses [24]. Ouyolu et al. [5] studied nurses working only in the intensive care units (ICUs) which are associated with higher than average levels of physical and mental stress; either or both these may have contributed to a higher prevalence of LBP in their sample, as both have been noted to be risk factors of LBP [10]. On the other hand, the nurse participants in the current study worked both in inpatient and outpatient setting, and only 12% worked in the ICU. In addition, as the causes of LBP are multifactorial, additional factors such as social, cultural and ethnic differences may have influenced the prevalence rate of LBP found in the current study.

Inconsistent with the study hypotheses, pain intensity was not associated with LWDs; nor was having a pain problem that was made worse with many of types of activities that nurses do. In fact, only two LBP-related factors – having constant pain and having a pain problem alleviated by rest – were significantly associated with the number of days that the participants reported they missed work. These findings have important implications for understanding the factors that do and do not impact LWDs and suggest avenues for possible interventions. To our knowledge, this represents the first time that either of these pain factors have been examined with respect to their association with LWDs. Therefore, it will be important to examine these associations in future studies to understand the reliability and generalizability of the findings.

4.1. What contributes to LWDs in nurses with LBP?

We were surprised that neither pain intensity nor the reported causes of worsening pain (i.e., pain made worse by the sorts of activities nurses engage in) were associated significantly with the number of reported LWDs. The negative finding regarding pain intensity is particularly important, because if replicated, it suggests that in order to facilitate a nurse's ability to work with LBP, treatment should not necessarily focus on reducing average or worst pain intensities. Although the presence of a significant correlation cannot be used to conclude causality, because correlation is a *necessary* condition for causality, the lack of an association can be used to conclude the lack of a causal relationship. In other words, factors *other than* average or worst pain intensity, or having a LBP problem made worse by lifting, bending, walking, or standing, appear to contribute to a nurse's decision to not work.

What might those other factors be? Two possible factors that emerged from the current analyses are (1) having constant pain and (2) having LBP pain problem that was alleviated with rest. The emergence of these factors is consistent with our *a priori* hypotheses. However, these factors explained no more than 11% of the

variance in LWDs over and above pain intensity. This leaves a great deal of unexplained variance to consider.

Contemporary models of chronic pain argue that biological, psychological, and social factors all contribute to pain and disability in individuals with chronic pain [25–27]. In the current study, we focused primarily on biological factors (intensity, reported cause of pain, and factors that relieved pain), although our hypothesis regarding the associations between factors that relieved pain and LWDs were based on biopsychosocial models regarding passive (thought to be generally maladaptive) versus active (thought to be generally adaptive) coping responses [28,29].

Thus, we would expect, based on a biopsychosocial perspective, that including measures of some key additional domains would have improved the predictive power of the model further. Specifically, it would have been useful to include measures of depression [30], anxiety [31], fear of movement [32,33], catastrophizing [34,35], significant other responses to pain [36], general social support [37,38], and work satisfaction [15]. Research that examined the relative importance of all of these factors in the same study would help identify those that play the most important roles in LBP-related disability among nurses, and inform the development of interventions that could be most beneficial.

4.2. Limitations

The current study has a number of limitations that should be considered when interpreting the findings. Importantly, the self-report measure of LWDs was based on the memories of the nurse participants, and we did not have a means of independently verifying the accuracy of their reports. While we cannot envision that the number reported would systematically under- or over-represent the true number of LWDs, future researchers should seek to confirm that accuracy of such reports, when possible. Also, and as already alluded to, the findings are based on cross-sectional data, from which causal conclusion cannot be drawn. Moreover, the factors assessed in this study focused primarily on the biomedical aspects of LBP. Interestingly, the single most important predictor of LWDs – pain alleviated with rest – points to the potential importance of psychosocial factors (e.g., coping). However, only 7% and 9% of the participants reported that medication and exercise alleviates LBP, respectively. Finally, consistent with nursing being primarily a female gender occupation in Nepal [23], all of the study participants were women. We were therefore unable to determine the extent to which the findings would generalize to nurses who are men. Future research should include measures of psychological and social factors as well in a larger sample (that also includes men), to help develop a more comprehensive model of LBP in nurses which could then be used to inform the development of effective treatments.

5. Conclusions

Despite the study's limitations, the findings indicate that the problem of LBP in nurses is not limited to nurses working in only Western countries; it is clearly a worldwide problem that needs to be addressed. The findings also indicate that while some biological factors may play an important role – in particular the presence of constant pain – many biological factors, including pain intensity, do not appear to play a significant role in the impact of LBP on work-related disability in nurses. Future research should look at psychosocial variables as potentially important factors to better understand work-related disability in nurses with LBP, and develop and evaluate the efficacy of treatments to decrease disability and improve quality of life in this population.

6. Implications

The most important clinical implication of the current findings which support LBP as a very common condition among nurses worldwide is that more needs to be done to prevent this serious and disabling condition. Evidence suggests that the primary cause of LBP in this population is the ongoing damage caused by frequent requirements to lift and transfer patients who often weigh much more than the recommended weight limit in occupation settings [39–42]. Importantly, this risk for ongoing damage is not reduced by rules requiring that more than one person (so called “lift team”) lift and transfer patients, manual material handling advice and training with or without assistive device [43]. Patients who are unable to carry their own weight should be lifted and transferred using patient handling equipment designed for that purpose [44,45].

When or if LBP has not been prevented and a nurse develops back pain, what should be done? Current guidelines indicate that ongoing movement and exercise is important for minimizing pain and disability in individuals who have LBP [46,12]. The results of the analyses reported here indicate, however, that nurses whose LBP is alleviated with rest are those most at risk for work-related disability. To the extent that these nurses may be resting as a way to cope with pain, they may be putting themselves at greater risk for increasing disability over time. Thus, they may be in particular need for learning strategies for staying active and increasing their overall activity tolerance. They could potentially benefit from reactivation treatments such as in vivo desensitization [47,48] or quota-based graded exercise programmes [49]. Research examining the efficacy of such treatments for reducing pain and disability among nurses with LBP is needed to help confirm their potential benefits in this population.

Conflict of interest

None.

References

- [1] Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, Williams G, Smith E, Vos T, Barendregt J, Murray C, Burstein R, Buchbinder R. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. *Ann Rheum Dis* 2014;73:968–74.
- [2] Karahan A, Kav S, Abbasoglu A, Dogan N. Low back pain: prevalence and associated risk factors among hospital staff. *J Adv Nurs* 2009;65:516–24.
- [3] Feng CK, Chen ML, Mao IF. Prevalence of and risk factors for different measures of low back pain among female nursing aides in Taiwanese nursing homes. *BMC Musculoskelet Disord* 2007;8:52.
- [4] Lin PH, Tsai YA, Chen WC, Huang SF. Prevalence, characteristics, and work-related risk factors of low back pain among hospital nurses in Taiwan: a cross-sectional survey. *Int J Occup Med Environ Health* 2012;25:41–50.
- [5] Owayolu O, Owayolu N, Genc M, Col-Araz N. Frequency and severity of low back pain in nurses working in intensive care units and influential factors. *Pak J Med Sci* 2014;30:70–6.
- [6] Sikiru L, Hanifa S. Prevalence and risk factors of low back pain among nurses in a typical Nigerian hospital. *Afr Health Sci* 2010;10:26–30.
- [7] Wai EK, Roffey DM, Bishop P, Kwon BK, Dagenais S. Causal assessment of occupational bending or twisting and low back pain: results of a systematic review. *Spine* 2010;10:76–88.
- [8] Yip Y. A study of work stress, patient handling activities and the risk of low back pain among nurses in Hong Kong. *J Adv Nurs* 2001;36:794–804.
- [9] Koppelaar E, Knibbe HJ, Miedema HS, Burdorf A. The influence of ergonomic devices on mechanical load during patient handling activities in nursing homes. *Ann Occup Hyg* 2012;56:708–18.
- [10] Bernal D, Campos-Serna J, Tobias A, Vargas-Prada S, Benavides FG, Serra C. Work-related psychosocial risk factors and musculoskeletal disorders in hospital nurses and nursing aides: a systematic review and meta-analysis. *Int J Nurs Stud* 2015;52:635–48.
- [11] Andersson GB. Epidemiological features of chronic low-back pain. *Lancet* 1999;354:581–5.
- [12] Delitto A, George SZ, Van Dillen LR, Whitman JM, Sowa G, Shekelle P, Denninger TR, Godges JJ. Low back pain. *J Orthop Sports Phys Ther* 2012;42:A1–57.
- [13] Hoy D, Bain C, Williams G, March L, Brooks P, Blyth F, Woolf A, Vos T, Buchbinder R. A systematic review of the global prevalence of low back pain. *Arthritis Rheum* 2012;64:2028–37.
- [14] Henderson M, Glozier N, Holland Elliott K. Long term sickness absence. *BMJ* 2005;330:802–3.
- [15] Hoogendoorn WE, Bongers PM, de Vet HC, Ariens GA, van Mechelen W, Bouter LM. High physical work load and low job satisfaction increase the risk of sickness absence due to low back pain: results of a prospective cohort study. *Occup Environ Med* 2002;59:323–8.
- [16] Roelen C, van Rhenen W, Schaufeli W, van der Klink J, Mageroy N, Moen B, Bjorvatn B, Pallesen S. Mental and physical health-related functioning mediates between psychological job demands and sickness absence among nurses. *J Adv Nurs* 2014;70:1780–92.
- [17] Eriksen W, Bruusgaard D, Knardahl S. Work factors as predictors of intense or disabling low back pain: a prospective study of nurses' aides. *Occup Environ Med* 2004;61:398–404.
- [18] Rauhaluoma A, Kivimäki M, Fagerstrom L, Elovainio M, Virtanen M, Vahtera J, Rainio AK, Ojaniemi K, Kinnunen J. What degree of work overload is likely to cause increased sickness absenteeism among nurses? Evidence from the RAFAELA patient classification system. *J Adv Nurs* 2007;57:286–95.
- [19] Chou R, Shekelle P. Will this patient develop persistent disabling low back pain? *JAMA* 2010;303:1295–302.
- [20] Martin MY, Bradley LA, Alexander RW, Alarcon GS, Triana-Alexander M, Aaron LA, Alberts KR. Coping strategies predict disability in patients with primary fibromyalgia. *Pain* 1996;68:45–53.
- [21] Mercado AC, Carroll LJ, Cassidy JD, Cote P. Passive coping is a risk factor for disabling neck or low back pain. *Pain* 2005;117:51–7.
- [22] Jensen MP, Karoly P. Self-report scales and procedures for assessing pain in adults. In: Turk DC, Melzack R, editors. *Handbook of pain assessment*. 3rd ed. New York: Guilford Press; 2011. p. 19–44.
- [23] Shrestha GK, Bhandari N, Singh B. Nurses' views on need for professional development in Nepal. *JNMA J Nepal Med Assoc* 2010;49:209–15.
- [24] Maul I, Laubli T, Klipstein A, Krueger H. Course of low back pain among nurses: a longitudinal study across eight years. *Occup Environ Med* 2003;60:497–503.
- [25] Chang HY, Jensen MP, Yang YL, Lee CN, Lai YH. Risk factors of pregnancy-related lumbopelvic pain: a biopsychosocial approach. *J Clin Nurs* 2011.
- [26] Demmelmaier I, Asenlof P, Lindberg P, Denison E. Biopsychosocial predictors of pain, disability, health care consumption, and sick leave in first-episode and long-term back pain: a longitudinal study in the general population. *Int J Behav Med* 2010;17:79–89.
- [27] Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull* 2007;133:581–624.
- [28] Carroll LJ, Ferrari R, Cassidy JD, Cote P. Coping and recovery in whiplash-associated disorders: early use of passive coping strategies is associated with slower recovery of neck pain and pain-related disability. *Clin J Pain* 2014;30:1–8.
- [29] Higgins NC, Bailey SJ, LaChapelle DL, Harman K, Hadjistavropoulos T. Coping styles pain expressiveness, and implicit theories of chronic pain. *J Psychol* 2014;1–14.
- [30] Pincus T, Williams A. Models and measurements of depression in chronic pain. *J Psychosom Res* 1999;47:211–9.
- [31] Asmundson GJ, Katz J. Understanding the co-occurrence of anxiety disorders and chronic pain: state-of-the-art. *Depress Anxiety* 2009;26:888–901.
- [32] Holden J, Davidson M, Tam J. Can the Fear-Avoidance Beliefs Questionnaire predict work status in people with work-related musculoskeletal disorders? *J Back Musculoskelet Rehabil* 2010;23:201–8.
- [33] Waddell G, Newton M, Henderson I, Somerville D, Main CJ. A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability. *Pain* 1993;52:157–68.
- [34] Domenech J, Sanchis-Alfonso V, Espejo B. Changes in catastrophizing and kinesiophobia are predictive of changes in disability and pain after treatment in patients with anterior knee pain. *Knee Surg Sports Traumatol Arthrosc* 2014.
- [35] Sullivan MJL, Bishop SR, Pivik J. The Pain Catastrophizing Scale: development and validation. *Psychol Assess* 1995;7:524–35.
- [36] Denison E, Asenlof P, Lindberg P. Self-efficacy, fear avoidance, and pain intensity as predictors of disability in subacute and chronic musculoskeletal pain patients in primary health care. *Pain* 2004;111:245–52.
- [37] Guillory J, Chang P, Henderson Jr CR, Shengelia R, Lama S, Warmington M, Jowza M, Gay G, Reid MC. Piloting a text message-based social support intervention for patients with chronic pain: establishing feasibility and preliminary efficacy. *Clin J Pain* 2015.
- [38] Hughes S, Jaremka LM, Alfano CM, Glaser R, Povoski SP, Lipari AM, Agnese DM, Farrar WB, Yee LD, Carson 3rd WE, Malarkey WB, Kiecolt-Glaser JK. Social support predicts inflammation, pain, and depressive symptoms: longitudinal relationships among breast cancer survivors. *Psychoneuroendocrinology* 2014;42:38–44.
- [39] Kuijper PP, Verbeek JH, Visser B, Elders LA, Van Roden N, Van den Wittenboer ME, Lebbink M, Burdorf A, Hulshof CT. An Evidence-Based Multidisciplinary Practice Guideline to Reduce the Workload due to Lifting for Preventing Work-Related Low Back Pain. *Ann Occup Environ Med* 2014;26:16.
- [40] Matheson LN, Verna J, Dreisinger TE, Leggett S, Mayer J. Age and gender normative data for lift capacity. *Work* 2014;49:257–69.
- [41] Snook SH, Ciriello VM. The design of manual handling tasks: revised tables of maximum acceptable weights and forces. *Ergonomics* 1991;34:1197–213.
- [42] Waters TR. When is it safe to manually lift a patient? *Am J Nurs* 2007;107:53–8, quiz, 59.

- [43] Verbeek JH, Martimo KP, Karppinen J, Kuijper PP, Viikari-Juntura E, Takala EP. Manual material handling advice and assistive devices for preventing and treating back pain in workers. *Cochrane Database Syst Rev* 2011;CD005958.
- [44] Kutash M, Short M, Shea J, Martinez M. The lift team's importance to a successful safe patient handling program. *J Nurs Adm* 2009;39:170–5.
- [45] Tullar JM, Brewer S, Amick 3rd BC, Irvin E, Mahood Q, Pompeii LA, Wang A, Van Eerd D, Gimeno D, Evanoff B. Occupational safety and health interventions to reduce musculoskeletal symptoms in the health care sector. *J Occup Rehabil* 2010;20:199–219.
- [46] Chou R, Qaseem A, Snow V, Casey D, Cross Jr JT, Shekelle P, Owens DK. Diagnosis and treatment of low back pain: a joint clinical practice guideline from the American College of Physicians and the American Pain Society. *Ann Intern Med* 2007;147:478–91.
- [47] Bailey KM, Carleton RN, Vlaeyen JW, Asmundson GJ. Treatments addressing pain-related fear and anxiety in patients with chronic musculoskeletal pain: a preliminary review. *Cogn Behav Ther* 2010;39:46–63.
- [48] Vlaeyen JW, de Jong J, Geilen M, Heuts PH, van Breukelen G. The treatment of fear of movement/(re)injury in chronic low back pain: further evidence on the effectiveness of exposure in vivo. *Clin J Pain* 2002;18:251–61.
- [49] Hartigan C, Miller L, Liewehr SC. Rehabilitation of acute and subacute low back and neck pain in the work-injured patient. *Orthop Clin North Am* 1996;27:841–60.