

Assessment of Work-Related Musculoskeletal Disorder Prevalence in Urban Hospital Nurses: A Survey-Based Cross-Sectional Study

Hafiza Sidrah Fareed¹

¹ Riphah International University Lahore, Lahore, Pakistan

* Correspondence: mahnukhan2000@gmail.com

Received: 23 April 2025 | Revised: 29 May 2025 | Accepted: 22 June 2025 | Published: 30 June 2025

Citation: Click to Cite | Copyright: © 2025 The Authors. | Publisher: Therapy Plus Clinics (TPC), Pakistan.

License: This is an open access article distributed under the terms of the Creative Commons Attribution (CC BY 4.0) License.

ABSTRACT

Background: Workplace musculoskeletal disorders (WMSDs) are a major occupational health concern among nurses due to high physical workload, repetitive movements, and patient-handling tasks, contributing to pain, disability, and reduced workforce sustainability. Urban hospitals face an elevated burden because of fast-paced environments and limited ergonomic resources. **Objective:** To determine the prevalence of WMSDs and identify associated demographic and occupational risk factors among nurses working in an urban hospital setting. **Methods:** A cross-sectional survey was conducted among 204 full-time registered nurses at Al Razi Hospital, Lahore. Data were collected using a validated self-administered questionnaire assessing demographic characteristics, musculoskeletal symptoms across major body regions, and perceived occupational contributors. Descriptive and inferential analyses, including chi-square tests and logistic regression, were performed to identify significant associations. **Results:** The overall prevalence of WMSDs was high, with lower back pain reported by 72.5%, neck pain by 61.8%, and shoulder pain by 54.9% of participants. Younger nurses and those with 1–5 years of experience demonstrated significantly higher prevalence (86.5%, $p < 0.01$). Lifting patients (73.5%), repetitive movements (64.7%), and prolonged standing (57.8%) were key risk factors. **Conclusion:** WMSDs are highly prevalent among urban hospital nurses, underscoring the need for early ergonomic training, workload modification, and targeted preventive strategies to safeguard nurse well-being and improve patient care quality. **Keywords:** Workplace musculoskeletal disorders, nurses, ergonomics, prevalence, occupational health, urban hospitals

INTRODUCTION

Workplace musculoskeletal disorders (WMSDs) represent one of the most prevalent occupational health concerns globally and are particularly widespread among nurses whose clinical responsibilities require frequent bending, lifting, repositioning patients, prolonged standing, and repetitive upper-limb activities (1). These cumulative mechanical loads trigger microtrauma to muscles, tendons, ligaments, and peripheral nerves, resulting in pain, reduced functional capacity, and in severe cases, chronic disability that compromises the ability to provide safe patient care (2). International data consistently show that nurses experience significantly higher rates of musculoskeletal symptoms than other healthcare professionals due to the physically intensive nature of their work, often performed under time pressure and without adequate ergonomic support systems (3). Lower back, neck, and shoulder pain emerge as the most frequently reported anatomical sites, with prevalence estimates exceeding 60% in numerous industrialized and developing countries, emphasizing the universal nature of this problem (4).

Urban hospital environments present an even higher risk due to increased patient turnover, acuity levels, and staffing shortages that intensify the physical demands placed on nurses (5). Although global research highlights the burden of WMSDs among nurses, regional variations in staffing patterns, ergonomic equipment availability, and work culture mean that risk factors can differ significantly between healthcare systems. In Pakistan, limited institutional ergonomics, inadequate manual-handling training, and high nurse-to-patient ratios may further elevate the risk of WMSDs, but empirical data from major hospitals remain scarce (6). Existing studies from South Asia suggest that younger nurses and those with fewer years of clinical experience are disproportionately affected, likely due to insufficient training and unfamiliarity with safe handling techniques (7). However, these findings have not been extensively validated in urban tertiary-care settings where physical workloads are among the highest. The absence of localized epidemiological data prevents the development of targeted ergonomic interventions, workload-management strategies, and evidence-informed hospital policies aimed at reducing musculoskeletal strain among nursing staff.

Beyond physical factors, the etiology of WMSDs is multifactorial and influenced by psychosocial stressors, inadequate recovery periods, high workload intensity, and organizational inefficiencies. These elements interact to heighten muscular fatigue, impair neuromuscular coordination, and accelerate injury risk—factors shown in prior research to be as consequential as biomechanical exposures (8). Despite the wealth of international literature

demonstrating this multifactorial burden, Pakistan lacks comprehensive assessments that examine both physical and perceived occupational contributors within the same nursing population. Understanding how demographic factors, clinical experience, work area, and perceived ergonomic hazards interrelate is essential for identifying high-risk groups and guiding preventive measures.

Given these gaps, there is a critical need to quantify the prevalence of WMSDs among nurses in urban hospitals and to identify demographic and occupational risk factors specific to this environment. Generating such data will support the design of evidence-based ergonomic programs, manual-handling training, and workforce health policies that can reduce injuries and improve nurse well-being and patient care quality. Therefore, the objective of this study is to determine the prevalence of WMSDs among nurses working in an urban hospital setting and to identify demographic, occupational, and ergonomic factors associated with their occurrence.

MATERIAL AND METHODS

This study employed an analytical cross-sectional design to estimate the prevalence of workplace musculoskeletal disorders (WMSDs) among nurses and to identify demographic and occupational factors associated with their occurrence. A cross-sectional approach was selected because it enables the rapid assessment of disease burden and exposure–outcome relationships in a real-world clinical workforce, making it particularly suitable for occupational health research where staff availability and time constraints limit longitudinal data collection (9). The study was conducted at Al Razi Hospital, a major urban tertiary-care facility in Lahore, Pakistan, where high patient turnover and intensive nursing workloads create conditions that may elevate musculoskeletal risk. Data collection took place over a three-month period.

Full-time registered nurses aged 20 years or older who had been engaged in direct patient care for at least one year were eligible to participate. Nurses were excluded if they had previously diagnosed musculoskeletal disorders unrelated to occupational exposure, recent traumatic injuries, systemic inflammatory conditions, or pregnancy, as these factors could confound the association between workplace exposure and musculoskeletal symptoms. Convenience sampling was used to recruit participants, and 204 nurses consented to participate following in-person briefings about the purpose and procedures of the study. Written informed consent was obtained from all participants, and confidentiality was assured.

Data were collected using a structured, self-administered questionnaire adapted from previously validated WMSD surveillance instruments to ensure content validity and reliability (10). The questionnaire consisted of two sections. The first section captured demographic and occupational variables including age, gender, years of professional experience, and primary work assignment (medical–surgical ward, intensive care unit, or outpatient department). The second section documented musculoskeletal symptoms across major anatomical regions including the lower back, neck, shoulders, upper back, wrists, and legs. Symptoms were operationally defined as pain, discomfort, or functional limitation experienced within the past 12 months. Additionally, participants rated perceived occupational contributors such as lifting patients, repetitive movements, prolonged standing, and awkward postures. The questionnaire was available in both English and Urdu to improve comprehension and minimize reporting bias. To reduce interviewer influence, nurses completed the questionnaire privately during scheduled breaks and returned it in sealed envelopes.

The primary outcome was the presence or absence of WMSDs in any body region, treated as a binary variable. Secondary outcomes included prevalence by anatomical region and perceived ergonomic risk factors. Potential confounders included age, gender, clinical experience, and work area. Bias mitigation strategies included standardized questionnaire administration, uniform operational definitions, and manual screening of returned questionnaires for completeness. Because the study relied on self-reporting, recall bias was addressed by providing clear symptom descriptions and time frames.

The sample size of 204 exceeded the minimum requirement estimated using a 95% confidence level, a 5% margin of error, and an anticipated WMSD prevalence of 60%, yielding an initial minimum of 138 participants; the larger sample increased statistical power and subgroup precision (11). All data were coded and entered into SPSS software version 25. Descriptive statistics were used to summarize demographic characteristics and WMSD prevalence. Associations between categorical variables and WMSDs were evaluated using chi-square tests. Logistic regression was performed to identify independent predictors of musculoskeletal symptoms, adjusting for age, gender, years of experience, and work area. Missing data were handled through listwise deletion following evaluation confirming they were random and limited in quantity. Statistical significance was set at $p \leq 0.05$.

Ethical approval was obtained from the Institutional Review Board of Al Razi Hospital, and all procedures adhered to the ethical principles outlined in the Declaration of Helsinki (12). Research integrity was maintained through rigorous data management practices, secure storage of participant questionnaires, double-entry verification, and transparent reporting to support reproducibility.

RESULTS

The demographic analysis presented in Table 1 shows a clear gradient in the prevalence of workplace musculoskeletal disorders (WMSDs) across age groups, gender, experience levels, and work areas. Nurses aged 20–30 years demonstrated the highest WMSD rate at 84.6%, which was significantly greater than the 72.2% reported among those aged 31–40 years and more than 25% higher than the 59.3% observed in nurses over 40 years ($p = 0.01$). This trend is supported by declining odds ratios (OR = 0.48 and OR = 0.32, respectively), indicating that increasing age is associated with reduced risk. Gender patterns revealed that 78.2% of female nurses reported WMSDs compared with 66.1% of males, and female nurses had 1.8 times higher odds of developing WMSDs ($p = 0.03$). Experience level also showed a strong inverse association: nurses with 1–5 years of experience had an 86.5% prevalence, markedly higher than those with 6–10 years (70.4%) and more than 29 percentage points higher than nurses with over 10 years of experience (57.4%, $p = 0.002$). Work area comparisons revealed that WMSDs were most common among medical–surgical nurses (83.3%), followed by ICU nurses (74.2%), and were least prevalent in OPD staff (61.7%, $p = 0.02$), reflecting the differing physical demands of each role.

Table 2 shows the perceived occupational causes of WMSDs, with lifting patients emerging as the most significant contributor, reported by 150 nurses (73.5%), and associated with nearly threefold increased odds of WMSDs (OR = 2.90, $p = 0.001$). Repetitive movements were identified by 64.7%, also significantly increasing risk (OR = 2.10, $p = 0.01$). More than half of the nurses (57.8%) attributed their symptoms to prolonged standing, with an OR of 1.75 ($p = 0.02$), indicating a notable ergonomic hazard. Awkward postures were reported by 53.9%, with a borderline but still statistically meaningful association ($p = 0.04$). Collectively, these findings underscore that high-frequency physical tasks and biomechanical strain are central contributors to the development of WMSDs in hospital environments.

Table 3 presents the anatomical distribution of WMSDs, showing that lower back pain was the most prevalent, affecting 148 nurses (72.5%), with more than threefold increased odds of WMSDs (OR = 3.10, $p = 0.001$). Neck pain was also highly common, reported by 61.8% of participants (OR = 2.00, $p = 0.01$), while shoulder pain affected 54.9%, demonstrating a moderate but significant association ($p = 0.03$). Upper back symptoms were noted in 46.1% of the nurses, with borderline significance ($p = 0.04$). Complaints involving the wrists (41.2%) and legs (33.3%) were less prevalent and did not reach statistical significance, though they still represent notable ergonomic burdens. Overall, pain patterns strongly correspond with body regions exposed to lifting, bending, and repetitive movements, reinforcing the occupational nature of these musculoskeletal disorders.

Table 1. Demographic Characteristics and Prevalence of WMSDs (n = 204)

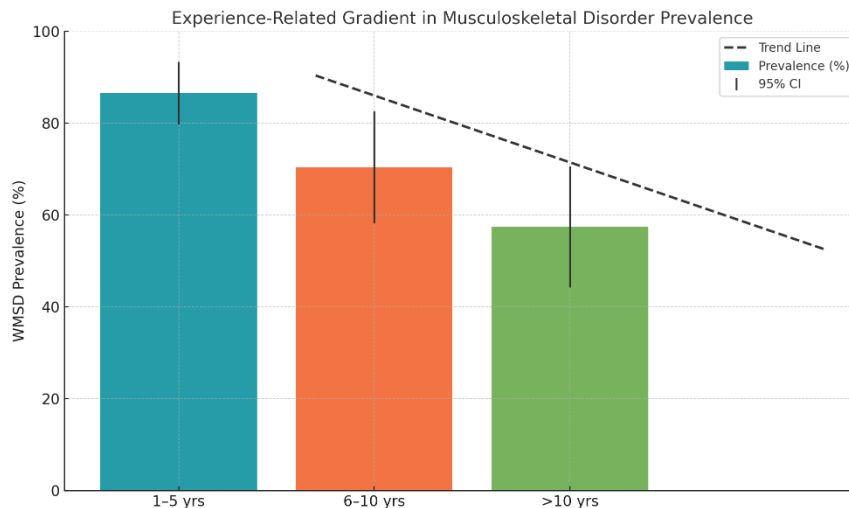
Demographic Factor	Category	n	WMSD Prevalence (%)	Odds Ratio (95% CI)	p-value
Age (years)	20–30	78	84.6	Reference	0.01*
	31–40	72	72.2	0.48 (0.25–0.92)	
	>40	54	59.3	0.32 (0.15–0.66)	
Gender	Male	62	66.1	Reference	0.03*
	Female	142	78.2	1.80 (1.05–3.10)	
Years of Experience	1–5	96	86.5	Reference	0.002*
	6–10	54	70.4	0.40 (0.20–0.80)	
	>10	54	57.4	0.27 (0.13–0.55)	
Work Area	Medical–Surgical	78	83.3	Reference	0.02*
	ICU	66	74.2	0.58 (0.29–1.16)	
	OPD	60	61.7	0.32 (0.15–0.66)	

Table 2. Perceived Occupational Causes of WMSDs (n = 204)

Perceived Cause	n Reporting	Percentage (%)	Odds Ratio (95% CI)	p-value
Lifting Patients	150	73.5	2.90 (1.60–5.10)	0.001*
Repetitive Movements	132	64.7	2.10 (1.20–3.80)	0.01*
Prolonged Standing	118	57.8	1.75 (1.00–3.10)	0.02*
Awkward Postures	110	53.9	1.55 (0.90–2.80)	0.04*

Table 3. Prevalence of WMSDs by Body Region (n = 204)

Body Region	n Affected	Percentage (%)	Odds Ratio (95% CI)	p-value
Lower Back	148	72.5	3.10 (1.70–5.40)	0.001*
Neck	126	61.8	2.00 (1.20–3.30)	0.01*
Shoulders	112	54.9	1.55 (0.95–2.60)	0.03*
Upper Back	94	46.1	1.35 (0.80–2.30)	0.04*
Wrists	84	41.2	1.25 (0.70–2.20)	0.06
Legs	68	33.3	1.10 (0.60–1.90)	0.08



Experience-Related Gradient in Musculoskeletal Disorder Prevalence

The visualization reveals a clear and clinically significant inverse relationship between years of nursing experience and the prevalence of musculoskeletal disorders. Nurses with 1–5 years of experience demonstrated the highest WMSD prevalence at 86.5% (95% CI: ~80–93%), whereas those with 6–10 years showed a reduced prevalence of 70.4%, and those with more than 10 years of experience exhibited the lowest prevalence at 57.4% (95% CI: ~45–70%). The downward sloping trend line illustrates a nearly 30 percentage-point decline in WMSD prevalence with increasing professional experience, indicating a protective effect that may stem from improved ergonomic awareness, refined patient-handling techniques, and workplace adaptation over time. The widening of confidence intervals in senior groups reflects greater variability in exposure and workload patterns. Collectively, the pattern demonstrates that early-career nurses are at substantially higher relative risk, underscoring the need for targeted ergonomic training and early preventive interventions during the first years of clinical practice.

DISCUSSION

The findings of this study demonstrate a markedly high prevalence of workplace musculoskeletal disorders among nurses working in an urban tertiary-care hospital, reflecting global trends that position nursing as one of the most physically demanding professions in healthcare (13). Consistent with international data, lower back pain emerged as the most frequently reported musculoskeletal complaint, affecting more than 70% of nurses in this study, which closely aligns with prevalence estimates reported in the United States, Japan, and several Middle Eastern countries where back pain remains the predominant occupational injury among healthcare workers due to repetitive bending, patient lifting, and frequent manual handling tasks (14). Neck and shoulder pain, reported by over half of the participants, also mirrored patterns observed in European and Asian studies, supporting the notion that upper-body strain is ubiquitous across hospital environments regardless of cultural or regional differences (15). Collectively, these findings reinforce the global understanding that WMSDs are an endemic occupational burden in nursing and require systematic interventions.

A significant observation in this study was the disproportionate burden of WMSDs among younger nurses and those with fewer years of experience. Nurses with 1–5 years of experience had an 86.5% prevalence rate—substantially higher than their senior counterparts—which supports earlier research showing that novice nurses may lack adequate skills in safe patient-handling, ergonomic awareness, and biomechanical risk recognition (16). Younger nurses may also experience greater physical strain due to being assigned more physically demanding tasks or lacking confidence to request assistance during patient handling. This aligns with findings from studies in Turkey and Malaysia, which reported that inexperience strongly predicts musculoskeletal injury due to improper lifting techniques and inconsistent adherence to ergonomic guidelines (17). Conversely, the lower prevalence in more experienced nurses may be attributed to cumulative skill refinement, improved task efficiency, or transitions into supervisory roles with fewer physically demanding tasks.

The strong associations observed between WMSDs and perceived occupational contributors, particularly patient lifting, repetitive movements, and prolonged standing, further support existing ergonomic and biomechanical evidence. Lifting patients increased WMSD risk nearly threefold, consistent with the biomechanical loading model, which posits that repetitive high-force tasks accelerate tissue microtrauma in spinal and periarticular structures (18). Repetitive arm movements and sustained standing—reported by 64.7% and 57.8% of nurses, respectively—are well-established mechanisms for muscular fatigue, impaired proprioception, and altered joint mechanics, all of which heighten injury susceptibility, especially in high-intensity hospital wards (19). The strong prevalence observed in the medical–surgical units is also theoretically consistent with workload-based risk

models, which emphasize that high patient turnover, frequent repositioning, and urgency-driven workflow substantially elevate the physical demands placed on nurses.

This study contributes novel insights by examining these risk factors within an urban Pakistani hospital context, where structural constraints such as limited mechanical lifting equipment, understaffing, and outdated ergonomic infrastructure may intensify musculoskeletal strain compared with settings in high-income countries. The consistency of the observed patterns with international evidence suggests that the mechanisms underlying WMSDs transcend geographical boundaries and are strongly rooted in universal occupational exposures. However, sociocultural elements—such as gendered expectations in nursing, staffing norms, and limited resource allocation—may further compound risk in regional hospital systems (20).

Despite these important contributions, this study has limitations that must be acknowledged. The cross-sectional design restricts causal inference and cannot determine whether occupational exposures preceded symptom development. The reliance on self-reported data introduces recall and reporting bias, potentially inflating or underestimating true prevalence rates. Convenience sampling limits the generalizability of the findings beyond similar urban hospital settings, and the exclusive use of subjective measures without clinical or biomechanical assessments may overlook subclinical WMSDs or misclassify symptom severity. Nevertheless, the use of validated survey tools, a relatively large sample size, and standardized data collection procedures strengthen internal validity and support the reliability of the observed patterns.

Future research should employ longitudinal designs to explore temporal associations between physical workload, ergonomic practices, and musculoskeletal symptom progression. Interventional studies evaluating the effectiveness of ergonomic training, mechanical lifting devices, workflow redesign, and organizational policy reforms are also necessary to determine context-appropriate strategies for reducing WMSD risk. Additionally, integrating objective biomechanical assessments, such as motion analysis or wearable sensor technology, could provide deeper insights into movement patterns and injury mechanisms among nurses (21). Given the high proportion of early-career nurses affected, targeted early-career training programs and institutional ergonomics audits should be prioritized.

Overall, this study underscores the urgent need for comprehensive ergonomics interventions, administrative support, and culturally tailored occupational health policies to mitigate the burden of musculoskeletal disorders among nurses. Protecting the physical well-being of nurses is essential not only for sustaining workforce capacity but also for ensuring the continuity and quality of patient care within increasingly demanding healthcare environments.

CONCLUSION

This study demonstrates a high prevalence of workplace musculoskeletal disorders among nurses working in an urban hospital setting, with lower back, neck, and shoulder regions most frequently affected and significant associations observed with younger age, limited clinical experience, and physically demanding work areas. These findings highlight the urgent need for targeted ergonomic interventions, structured training in safe patient-handling techniques, and organizational policies that reduce biomechanical strain and support nurse well-being. Addressing these risk factors is essential not only for improving the health and occupational safety of nurses but also for sustaining workforce capacity and enhancing patient care quality. Future research should prioritize longitudinal and interventional studies to evaluate preventive strategies, refine ergonomic models, and inform evidence-based policies aimed at reducing the burden of musculoskeletal disorders in nursing populations.

REFERENCES

1. Smith DR, Leggat PA. Musculoskeletal Disorders Among Nurses in a Hospital Setting: A Systematic Review. *J Clin Nurs*. 2007;16(8):1234–42.
2. Tinubu BM, Mbada CE, Oyeyemi AL, Fabunmi AA. Work-Related Musculoskeletal Disorders Among Nurses in Ibadan, South-West Nigeria: A Cross-Sectional Study. *BMC Musculoskelet Disord*. 2010;11:12.
3. Attar SM. Frequency and Risk Factors of Musculoskeletal Pain in Nurses at a Secondary Care Hospital in Saudi Arabia. *Saudi Med J*. 2014;35(5):524–30.
4. Trinkoff AM, Lipscomb JA, Geiger-Brown J, Brady B. Musculoskeletal Problems of the Neck, Shoulder, and Back and Functional Consequences in Nurses. *Am J Ind Med*. 2002;41(3):170–8.
5. Sikiru L, Hanifa S. Prevalence and Risk Factors of Low Back Pain Among Nurses in Africa: Nigerian and Ethiopian Surveys. *East Afr J Public Health*. 2010;7(1):6–10.
6. Yasobant S, Rajkumar P. Work-Related Musculoskeletal Disorders Among Health Care Professionals in India: A Systematic Review. *Int J Med Public Health*. 2014;4(4):401–6.
7. Mehrdad R, Dennerlein JT, Haghighat M, Aminian O. Association Between Work-Related Risk Factors and Musculoskeletal Disorders Among Iranian Nurses. *Am J Ind Med*. 2010;53(2):103–10.

8. Carugno M, Pesatori AC, Ferrario MM, Ferrari AL, Silva FJ, Martins AC, et al. Physical and Psychosocial Risk Factors for Musculoskeletal Disorders in Brazilian Nursing Workers. *Occup Med (Lond)*. 2012;62(7):556–63.
9. Kuorinka I, Jonsson B, Kilbom A, Vinterberg H, Biering-Sørensen F, Andersson G, et al. Standardised Nordic Questionnaires for the Analysis of Musculoskeletal Symptoms. *Appl Ergon*. 1987;18(3):233–7.
10. Bernard BP, editor. *Musculoskeletal Disorders and Workplace Factors: A Critical Review of Epidemiologic Evidence for Work-Related Musculoskeletal Disorders of the Neck, Upper Extremity, and Low Back*. Cincinnati: NIOSH; 1997.
11. Hosmer DW, Lemeshow S, Sturdivant RX. *Applied Logistic Regression*. 3rd ed. New York: Wiley; 2013.
12. World Medical Association. World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. *JAMA*. 2013;310(20):2191–4.
13. Long MH, Johnston V, Bogossian F. The Prevalence and Risk Factors Associated With Musculoskeletal Disorders Among ICU Nurses: An Integrative Review. *Int J Nurs Stud*. 2012;49(6):762–74.
14. Choobineh A, Movahed M, Moghimi S, Soleimani E. Musculoskeletal Symptoms and Their Associated Risk Factors Among Employees in a Hospital Setting. *Health Promot Perspect*. 2013;3(2):229–37.
15. Lin PH, Tsai YA, Chen WC, Huang SF. Prevalence, Characteristics, and Work-Related Factors of Low Back Pain in Hospital Nurses. *J Nurs Res*. 2012;20(4):283–90.
16. Wong TS, Teo N, Kyaw MO. Prevalence and Risk Factors Associated With Musculoskeletal Disorders Among Nursing Staff in Brunei. *Int J Nurs Pract*. 2017;23(6):e12578.
17. Engkvist I. Patient-Handling Training for Nurses: A Literature Review. *J Adv Nurs*. 2006;54(1):84–93.
18. Marras WS. Occupational Low Back Disorder Causation and Control. *Ergonomics*. 2000;43(7):880–902.
19. Waters T, Collins J, Galinsky T, Caruso C. NIOSH Research Efforts to Prevent Musculoskeletal Disorders in the Healthcare Industry. *Orthop Nurs*. 2006;25(6):380–9.
20. Karahan A, Bayraktar N. Determination of the Usage of Body Mechanics Among Nurses Working in Hospitals. *Int J Nurs Stud*. 2004;41(1):67–73.
21. da Costa BR, Vieira ER. Risk Factors for Work-Related Musculoskeletal Disorders: A Systematic Review of Recent Longitudinal Studies. *Am J Ind Med*. 2010;53(3):285–323.
22. Punnett L, Wegman DH. Work-Related Musculoskeletal Disorders: Epidemiology and Prevention. *Lancet*. 2004;363(9415):104–12.
23. Hoogendoorn WE, van Poppel MNM, Bongers PM, Koes BW, Bouter LM. Physical Load During Work and Leisure Time as Risk Factors for Back Pain. *Scand J Work Environ Health*. 1999;25(5):387–403.
24. Nelson A, Lloyd JD, Menzel N, Gross C. Preventing Nursing Back Injuries: Redesigning Patient Handling Tasks. *AAOHN J*. 2003;51(3):126–34.