

Suppl. 2. Results of two-phase analysis (n = 8)

Title and location	Authors and year of publication	Study sample and characteristics	Study design and tool	LBP prevalence	Conclusion and recommendation
Work-Related Factors Associated with Lower Back Pain Among Nurse Professionals in East and West Wollega Zones, Western Ethiopia Ethiopia, Africa	Mekonnen, 2019	N = 418 Registered nurses with at least 12 months of professional experience in direct hospital care	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> The standardized Nordic musculoskeletal questionnaire and the Von Korff pain scale	LBP prevalence during 12 months 63.6% (N = 266) and 53.4% (n = 142) over the preceding 7 days	The length of employment, the amount of working hours in a shift, and a lack of safety training have a considerable effect on the incidence of lower back pain in nurses. The findings support the significance of launching procedures aimed at the prevention and monitoring of back injuries and pain. Limiting the excessive physical workload during shifts, and regular healthcare and safety manual handling training are necessary measures in order to reduce the incidence of lower back pain.
Association between high fear-avoidance beliefs about physical activity and chronic disabling lower back pain in nurses in Japan Japan, Asia	Fujii et al., 2019	N = 3066 Registered nurses working in direct care for patients from 12 different hospitals all over Japan	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> Non-standardized online survey and the standardized questionnaires assessing the mental strain – The Kessler Psychological Distress Scale (K-6) –and a questionnaire analyzing the issue of mental activity – Fear-Avoidance Beliefs Questionnaire (FABS)	LBP prevalence during 12 months 75.9%, and 58.7% over the preceding 4 weeks	The results of this study revealed the relationship of the physical workload and the incidence of chronic lower back pain in the interviewed nurses in Japan. Specifying the physical activities related to the incidence of lower back pain might be beneficial for the management of the issue of musculoskeletal lower back pain in nurses.
Prevalence of lower back pain and associated factors among nurses in Jordan Jordan, Middle East	Suliman, 2018	N = 384 Registered nurses with at least 12 months of professional experience in direct hospital care. (Wards and ITU)	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> Non-standardized questionnaire using the numeric pain rating scale (0–10).	Current LBP prevalence 69% (n = 265) 1 year prevalence 78,9% (n = 303) and cumulative LBP prevalence 83.6% (n = 321)	Higher risk of lower back pain occurrence was found in nurses of a higher age, females, overweight, and length of professional experience. The necessity of sick leave as a consequence of lower back pain was found in 40% of the interviewed hospital nurses, while productivity was lower in 58.7%. 9% of nurses stated that they had been made to change ward. These findings point to the fact that lower back pain prevalence is a serious work-related issue among Jordan nurses and that interdisciplinary measures need to be taken in order to reduce the lower back pain incidence rate.
Awkward trunk postures and their relationship with lower back pain in hospital nurses Tehran, Iran	Nourollahi et al., 2018	N = 80 Registered nurses working at eight different hospital wards	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> The standardized Nordic musculoskeletal questionnaire	72%	The results of this study confirmed that awkward trunk postures during manual handling, together with excessive manual handling of immobile patients and repetitive monotonous spine movements increase the risk of lower back pain occurrence in professional nurses. These findings emphasize the necessity of launching procedures to reduce the incidence rate of back pain in nurses, in particular by introducing labour regulations based on ergonomic manual handling principles.

Suppl. 2. (continued)

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Musculoskeletal Disorders: Prevalence and Associated Factors among District Hospital Nurses in Haiphong, Vietnam Hai Phong, Vietnam	Luan et al., 2018	N = 1179 Registered nurses with at least 12 months of professional experience in direct hospital care	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> Interview using questions from the standardized Nordic musculoskeletal questionnaire	LBP prevalence during 12 months 74.7% and 41.1% over the preceding 7 days. The musculoskeletal pain occurred most frequently in the lower back (44.4%) and in the neck (44.1%)	It is necessary to launch preventive measures to improve the working conditions and also to increase awareness of prevention of musculoskeletal disorders in nurses.
Occupational factors and lower back pain: a cross-sectional study of Bangladeshi female nurses Bangladesh, India	Sanjoy et al., 2017	N = 229 Registered female nurses working in two major hospitals in Bangladesh	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> Interview based on the standardized Nordic musculoskeletal questionnaire and the Karasek's Job Content Questionnaire	73% over the preceding 12 months	The results of the study refer to the factors of the risk of lower back pain occurrence, namely due to insufficient support among employees, overtime work, and manual handling and lifting of patients using no lifting aids. The authors recommend that employers at medical institutions focus on increasing the support for their employees, in particular by reducing the amount of working time per week and limiting the frequency of manual lifting at workplaces.
Increased lower back pain risk in nurses with high workload for patient care: A questionnaire survey Taiwan, China	Shieh et al., 2016	N = 788 Registered nurses working in direct patient care in Taiwan	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> Non-standardized online survey	LBP prevalence was discovered in 72% (n = 567) over the preceding 12 months	The results indicate that the prolonged working hours and the care for a higher number of immobile patients contribute to the occurrence of the lower back pain. State authorities and institutions should pay more attention to the issue of health and safety at work in healthcare professionals. The managements of healthcare organizations should prevent their healthcare professionals from performing long shifts in a mentally distressing environment, and stop overtime that is ordered as a consequence of medical staff shortage. Furthermore, employers should also provide training and support in establishing ergonomic procedures for patient handling and manual handling in order to support lower back pain prevention.
Tasks of hospital nurses and work-related musculoskeletal disorders symptoms: A detailed analysis Portugal, Southern Europe	Serranheira et al., 2015	N = 1,396 Registered nurses working in hospital care across the whole of Portugal	<i>Study design:</i> Cross-sectional study <i>Study tool:</i> The standardized Nordic musculoskeletal questionnaire (online survey)	LBP prevalence during 12 months was 60.9%, and 48.8% over the preceding 7 days	The authors have concluded that if nursing tasks performed regularly by nurses, such as invasive intervention, assistance in hygiene and providing comfort for the patient in bed, mobilization of the patient and feeding, are performed more than ten times per shift, it contributes largely to the occurrence of lower back pain in this profession. The results may indicate that healthcare professionals are exposed to excessive workload, distress and heavy physical work tasks in awkward postures.