

## MUSCULOSKELETAL DISORDERS IN THE NURSING PROFESSION AND THE EFFECTIVENESS OF INTERVENTIONS TO PREVENT THESE DISORDERS: A LITERATURE REVIEW

Sebastjan Mjekaj<sup>1\*</sup>, Enkeleda Sinaj<sup>2</sup>, Julian Kraja<sup>1</sup>, Edra Fresku<sup>3</sup>, Erjona Abazaj<sup>4</sup>

<sup>1</sup>*University of Shkodra "Luigj Gurakuqi", Department of Preclinical Subjects, Shkodra, Albania;*

<sup>2</sup>*Tirana Medical University, Faculty of Medical Technical Sciences, Tirana, Albania;*

<sup>3</sup>*University of Shkodra "Luigj Gurakuqi", Faculty of Natural Sciences,  
Departments of Mathematics, Shkodra, Albania;*

<sup>4</sup>*Institute of Public Health, Department of National Reference Laboratories, Tirana, Albania;*

\*Corresponding Author Sebastjan Mjekaj, e-mail: [sebastjan.mjekaj@unishk.edu.al](mailto:sebastjan.mjekaj@unishk.edu.al);  
[enkeleda.sinaj@umed.edu.al](mailto:enkeleda.sinaj@umed.edu.al); [julian.kraja@unishk.edu.al](mailto:julian.kraja@unishk.edu.al);  
[edra.fresku@unishk.edu.al](mailto:edra.fresku@unishk.edu.al); [abazajerjona@gmail.com](mailto:abazajerjona@gmail.com);

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### ABSTRACT

Introduction: Work-related musculoskeletal disorders is a broad term used to describe conditions or injuries caused by overuse of some of the muscles, tendons, nerves, ligaments, joints and supporting blood vessels, as a result of a work-related activity. The objective of the present study was to undertake a systematic review of the extant literature pertaining to the prevalence of musculoskeletal disorders among nursing personnel. The review further sought to ascertain the efficacy of interventions designed to prevent such disorders. Method: The selection of all material utilised in this study commenced in May 2024. The materials were collected on EBSCO platforms in the PubMed/MEDLINE databases, as well as in Web of Science, SCOPUS, and Science Direct. Results: The primary articles evaluated focused on musculoskeletal disorders, with a particular emphasis on the efficacy of rehabilitation interventions for their prevention. A comprehensive analysis of seven studies from diverse geographical regions and socioeconomic levels was conducted, which were then categorised into two groups. The first group comprised four scientific papers that primarily assessed musculoskeletal disorders, their prevalence, or contributing factors. The second group, which included three scientific papers, evaluated the effectiveness of preventive and advisory measures for nursing staff. The conclusions drawn from this study are as follows: The risk factors that directly affected work-related musculoskeletal disorders in nursing staff were numerous. A significant number of participants reported a paucity of information and training with regard to the prevention of such disorders. A consensus emerged from the collective analysis, recommending modifications to work methodologies and the implementation of educational interventions aimed at enhancing nurses' knowledge, attitudes, and behaviours. The study underscored the pivotal role of health education in fostering behaviours that contribute to the prevention of disorders.

**Keywords:** Nurses, musculoskeletal disorders, effectiveness of interventions, prevention

## INTRODUCTION

Work-related musculoskeletal disorders are a broad term used to describe conditions or injuries caused by overuse of certain muscles, tendons, nerves, ligaments, joints, and supporting blood vessels, as a result of work-related activity (1-3). These disorders are known to cause pain or discomfort and are influenced by the working conditions and work environment of the affected individual (4). Examples of work-related musculoskeletal disorders (WRMSDs) include back pain, shoulder pain, repetitive strain injuries, and joint pain, which can result in impaired body movement (4-6). Musculoskeletal disorders are prevalent on a global scale, with a high prevalence observed among the general population and a wide range of occupations. A comparison of the prevalence of these disorders across different occupations reveals that medical staff are among the most affected, given that their work typically demands physical exertion and movement (2). Research has indicated that healthcare workers are more likely to experience work-related musculoskeletal disorders (WMSDs) compared to those employed in the construction, mining, and manufacturing sectors [3, 6-9]. Among healthcare personnel, those who provide direct patient care, particularly nurses and other medical staff, are particularly susceptible to musculoskeletal disorders (2,4, 8, 9). The prevalence of WRMSDs has been estimated to be approximately 33–88% among nursing staff (4). A higher prevalence of WMSDs has also been reported among medical staff (nurses) involved in the care and service of the elderly. According to Kromark et al. (2009), healthcare staff in nursing homes are seven times more likely to suffer from back pain compared to those providing care at home. This elevated risk has been attributed to specific risk factors, including professional manual handling, the process of changing patients' clothes, the act of lifting and lowering patients to perform their daily and personal needs, and the role of a health assistant (12).

Simon et al., 2008, noted that a European study (NEXT) conducted in seven countries found that 63.5% of nurses working in nursing homes for the elderly had left the profession as a result of work-related musculoskeletal disorders or injuries (13). In addition to the health concerns that musculoskeletal disorders cause, they pose a significant burden to both the employee and the employer as they carry a high cost of absenteeism, high cost of medical treatment, compensation for workplace injuries and permanent musculoskeletal limitations (14-16). Consequently, workplace interventions to prevent such disorders are of paramount importance in reducing the prevalence or intensity of musculoskeletal pain, averting physical suffering and work disability, and thereby promoting the health of workers. Given the multifactorial nature of WMSDs and their impact on workers' health, the assessment of the effect of workplace interventions for the prevention of WMSDs is a necessary topic on a research agenda, seeking evidence of interventions that can help reduce the incidence, prevalence, and severity of this disease (15). In this study, we conducted a systematic review of the literature to assess the effectiveness of interventions designed to prevent musculoskeletal disorders in nursing staff.

## MATERIAL AND METHOD

### **Study Methodology**

#### ***Study Design***

The nature and purpose of this study necessitated the implementation of a systematic literature review, a methodology that has been demonstrated to ensure the attainment of reliable results from which valid conclusions can be drawn and decisions made. This approach is further substantiated by numerous studies which have asserted the efficacy of a scientific and systematic literature methodology in minimising the risk of bias and providing a framework for clinics and health policies to base their decisions on the research findings (17-19). The present study is part of a research project for the third cycle of the doctoral degree, which was approved by the Ethics Council at the University of Medicine of Tirana (No. 10) in March 2024. The research questions that guided the definition and selection of the research strategy or eligibility criteria were as follows: What are the musculoskeletal disorders in the nursing profession, their prevalence and range, and the effects of WMDR prevention as an intervention in nursing practice?

#### ***Research Strategy and Study Eligibility Criteria***

The selection and collection of all material to be used as a source of information in this study commenced in May 2024. The materials were collected on EBSCO platforms in the PubMed/MEDLINE databases, as well as in Web of Science, SCOPUS, and Science Direct. The selection process involved the utilisation of keywords, including but not

limited to 'musculoskeletal disorders', 'nursing', 'effects of WMDR prevention', and 'interventions in nursing practice for WMDR'. These keywords served to enhance the awareness of contemporary scientific knowledge pertaining to these issues, while concomitantly ensuring the exclusive consideration of materials that possessed significant analytical value. This approach was undertaken to facilitate the attainment of substantial conclusions concerning our designated topic.

The inclusion criteria encompassed primary experimental and epidemiological articles or studies, cohort studies, case-control studies, and well-designed systematic reviews and meta-analyses. These criteria were met if they measured both musculoskeletal disorders in the nursing profession and interventions for the prevention and/or reduction of musculoskeletal disorders in these professions. The study's limitations included the restriction of publications to Albanian and English languages, the requirement for research to be conducted within the past decade, and the restriction of musculoskeletal disorders to the nursing profession, excluding cases in the general population or other risk groups. Furthermore, studies that were in the process of publication as well as abstracts in conferences, both within the country and abroad, related to the topic of our study were determined as exclusion criteria of the study. 2.3.

### Data extraction and quality assessment

The data extraction process was initiated by the analysis of the title and abstract of all articles based on the selection criteria that had been initially defined. This process was carried out by the working group, which then designed an Excel file for the extraction and processing of the obtained data. The articles selected for inclusion in this study were then organised according to the following points: study identification (author, year of publication and country), objective, type of study, sample and results, etc. The quality of the evidence collected and then analysed was considered to be adequate if a confidence interval of 95% was obtained. The flowchart illustrating the selection of literature employed in this study is presented in Figure 1.

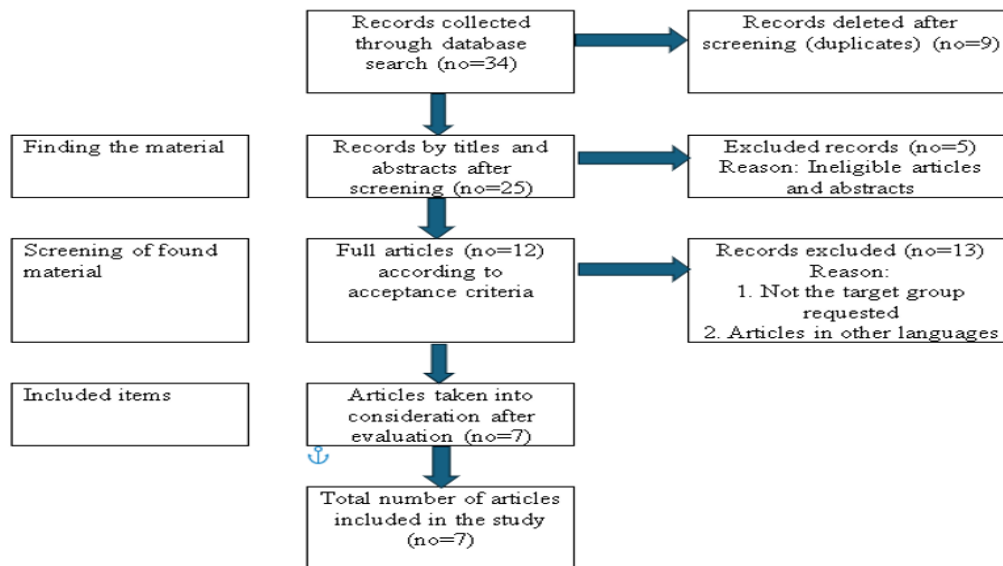


Figure 1. The following figure presents a schematic representation of the literature selection process for the systematic review, which is focused on musculoskeletal disorders in nurses.

## RESULTS

The primary outcomes evaluated were musculoskeletal disorders, and knowledge of the effectiveness of rehabilitation and interventions to prevent these disorders. Table 1 presents the findings of the seven articles considered for this literature review.

Table 2. Findings from the database search of papers.

Author Year, Country/ City	Study design	Purpose/Objectives of the study	The sample taken in the study	Professional settings	Data collection	Intervention/ Results	Conclusion
Paula Carneiro, et al., 2017 Portugal (20)	The research method was based on the standardized Nordic questionnaire.	The objective of this study is to identify the most affected regions of the body as a result of musculoskeletal complaints in care homes. The study will also develop a statistical model, which includes the main risk factors.	222 participants	Home care nurses.	Nordic Standardized Questionnaire	The present study hypothesises that nursing home nurses are three times more likely to experience low back complaints than their counterparts working solely in health centres. A seven-variable statistical model was utilised to predict low back complaints.	The lumbar region was identified as the most affected by musculoskeletal complaints. These complaints were associated with seven different factors, which were: forearm posture; static postures; arm posture; arm support; bed height; job satisfaction; assistive devices. It was observed that all of these factors exerted an influence on the incidence of musculoskeletal complaints among the nurses participating in this study.
Tharaya Alabri; et al., 2023 Oman (21)	A cross-sectional, descriptive and correlational study.	To assess the prevalence and explore the associated factors of WRMSDs among nurses working in a tertiary hospital in Oman.	125 participants	Nurses	Nordic Standardized Questionnaire	The investigation revealed that no demographic or occupational factors were found to be associated with musculoskeletal disorders.	Musculoskeletal disorders are a prevalent occurrence among nurses in Oman. The factors that contribute to the development of these symptoms are the nature of the work they do in the hospital, regardless of demographic or workplace characteristics. It is therefore recommended that health institutions implement preventive and rehabilitative measures to help nurses achieve better musculoskeletal health.
Nemera et al., 2021. Etiopi (22)	Cross-sectional study	The objective of this study is to assess the magnitude of work-related musculoskeletal disorders and contributing factors among nurses at West Shoa Area Hospital, Central Ethiopia, in 2021.	406 systematically selected participants	Nurses	The present study elected to utilise a simple random sampling as the subject for its investigation. The collection of data was conducted through the utilisation of face-to-face interviews.	The prevalence of work-related musculoskeletal disorders was 73.8%, with the highest prevalence being referred to the lower back. Operating room nursing staff exhibited a higher risk of musculoskeletal disorders, with bending or twisting	The prevalence of work-related musculoskeletal disorders among nurses was high. A paucity of on-the-job training to prevent such disorders was identified. Given the preventable nature of such disorders, it is imperative that educational initiatives are implemented to instruct personnel in the appropriate utilisation of body mechanics and the adaptation of work environments.

						being identified as a contributing factor. This increased the likelihood of developing such disorders by up to 2.33 times compared to staff employed in other wards.	
Olutende, et al. (2022) Kenya (23)	This is a cross-sectional descriptive study that has been conducted in conjunction with quantitative methods.	The objective of this study is to investigate the risk factors associated with work-related musculoskeletal disorders among nurses in Kakamega County.	130 participants	Nurses	A self-administered questionnaire was utilised for the purpose of data collection. Participants were selected at random.	About 76.9% of nurses had major problems if they followed a large number of patients and performed orthopedic manual techniques. Also, 81.5% had major problems when they did not have breaks during working hours. There was a significant association between lack of breaks or sufficient breaks during working hours, between working in difficult positions, or injuries at work and WRMSD among the study participants.	The WRMSD identified several risk factors, including the repetition of the same positions for extended periods, the handling or transfer of a large number of patients, and the exertion of force in the execution of tasks. The study recommends a change in work technique, with the use of lifting equipment, the regular changing of tasks, the reduction of the number of patients, and the taking of breaks to avoid awkward hunched positions, repetitive work, and difficult tasks.
Rakhsani et al., (2024) Iran (24)	A quasi-experimental study. The study participants were divided into two groups (experime	The objective of this study is to utilise the PRECEDE-PROCEED model to design an educational intervention, with the	120 participants	Nurses in the hospital	The questionnaire is composed of two sections. The first section contains personal information, while the	The utilisation of the PRECEDE-PROCEED model to promote preventive measures for musculoskel	The present study's educational intervention has been shown to engender enhancements in nurses' knowledge, attitudes, training and reinforcement structures, as well as their behaviours, etc.

	ntal and control group)	subsequent aim of investigating its effects on a group of nurses. The investigation will focus on the nurses' preventive behaviours with regard to musculoskeletal disorders.			second section is based on the PRECEDE-PROCEED model.	etal disorders in hospital nurses.	
Soler-Font et al. (2019) Barcelona (Spanjë) (25)	The ensuing discourse shall present the findings of a cluster randomised controlled trial.	The following study will evaluate a multifaceted intervention for the prevention and management of musculoskeletal disorders in two hospitals.	A total of 473 participants were divided into eight groups, the allocation of which was determined by randomisation.	Nurses and nursing assistants	The participatory ergonomics model was divided into three phases: diagnosis, treatment and implementation. The programme commenced with the diagnostic phase, which entailed the administration of a self-completed questionnaire. The lifestyle promotion programme was developed to encourage healthy lifestyles, including activities such as Nordic walking, and awareness of a healthy diet based on the Mediterranean diet.	The presence of self-perceived musculoskeletal pain was measured using a validated adaptation of the Standardised Nordic Spanish Questionnaire, which employs the ERGOPAR method to analyse musculoskeletal symptoms. This assessment was conducted at the 6-month and 12-month follow-up points. Work functioning was measured after six and 12 months using the Work Role Functioning Questionnaire-Spanish Version (WRFQ-SpV).	It is imperative to devise multifaceted interventions that are targeted towards the prevention and management of musculoskeletal disorders in nursing staff and other professional groups. The efficacy of such an intervention in reducing neck, shoulder and back pain has been demonstrated. It is further suggested that interventions to reduce and manage disorders require a multifactorial approach, incorporating the three levels of prevention.
Kurowski et al. (2017) Shtetet e Bashkuara të Amerikës (26)	Post-intervention study	The objective is to reduce the incidence and cost of work-related musculoskeletal disorders.	11, 603 participants	Nurses and healthcare assistants Nursing home	Workers' compensation data.	Purchase of mechanical lifting equipment. -Training of workers. -Availability of operating/maintenance procedures	The implementation of these interventions resulted in a decline in workers' compensation claims, ranging from 11% to 14%, in the period following the first and second year of the study.

### *Discussions*

In the seminal study by Russell et al. (2016), the term "work-related illness" is defined as any physical or mental illness that is either caused or aggravated by work. This concept encompasses a more extensive range of phenomena in comparison to that of occupational disease, which pertains to a specific category of described physical health problems caused by work that form the basis of compensation systems for occupational diseases and injuries. The impact of work-related illnesses extends beyond the individual to encompass their families, employers, the health system, and consequently, the economy and wider society (1). A number of studies have identified risk factors for work-related musculoskeletal disorders, including rapid repetitive work movements, poor body posture and prolonged hours of patient care and managing uncooperative patients (2).

Furthermore, studies have demonstrated that the greater the patient dependency on medical staff (a factor that is particularly salient in the elderly), the greater the requirement for caregiving assistance, which, in turn, increases the risk of work-related musculoskeletal disorders among nursing home staff in comparison to other nursing specialties (26). The present study was undertaken to assess the problems encountered in different studies and the management or effectiveness of preventive and educational measures for medical staff, especially nurses.

As previously stated, a comprehensive analysis of seven studies from diverse geographical areas and socio-economic levels was conducted, which were then categorised into two groups. The first group consists of four scientific papers that primarily evaluate the prevalence and contributing factors of musculoskeletal disorders. The second group, which consists of three scientific papers, evaluates the effectiveness of preventive and advisory measures employed by nursing professionals. The ensuing discussion will present a synopsis of the salient findings derived from this comprehensive review of the extant literature.

Paula et al., 2017, sought to identify the demographic most affected by musculoskeletal complaints and to develop a statistical model incorporating the primary risk factors. The analysis involved the participation of 22 nurses from nursing homes. The identification of complaints was facilitated by the utilisation of the standardised Nordic questionnaire.

Utilising their statistical analysis, they ascertained that nursing home nurses exhibited a threefold elevated probability of experiencing lumbar complaints in comparison to their counterparts employed exclusively in health centres. This finding underscores the significance of these care centers as a major risk factor.

Conversely, the researchers identified seven factors within the model employed in the study that may directly contribute to the occurrence or absence of low back complaints in home care nurses. These factors include forearm posture, static postures, arm posture, arm support, bed height, job satisfaction and patient movement/transfer aids. The statistical model applied by them can accurately predict the risk of complaints in the low back region with a probability of 88.4% (20).

Tharaya Alabri; et al., 2023 conducted a study in the Oman region, with the aim of assessing the prevalence of WRMSDs and exploring the associated factors among nurses working in a tertiary hospital in Oman. The study population comprised 125 nurses from the aforementioned hospital. The researchers also used the standardized Nordic questionnaire for data collection. Despite the prevalence of musculoskeletal disorders among nurses in Oman, the study found no association between demographic characteristics and work-related musculoskeletal disorders. However, the analysis of the study indicated that the development of these disorders was influenced by factors associated with the nature of the work, the workplace environment, and the intensity of the work undertaken by nurses according to their respective wards. The study's findings suggest that health institutions should consider implementing preventive and rehabilitative measures to support nurses in maintaining optimal musculoskeletal health (21).

In a study conducted by Namera et al. (2021) in Ethiopia, the magnitude of work-related musculoskeletal disorders and its associated factors were assessed among nurses in West Shoa Zone Hospitals, in the Central part. The study found that: Amongst a sample of 406 nurses selected at random, the prevalence of work-related musculoskeletal disorders was found to be 73.8%, with the lower back demonstrating the highest prevalence. Operating room nursing staff exhibited a higher risk of musculoskeletal discomfort, underscoring it as a significant problem due to the bending or twisting of the body, thereby increasing the likelihood of these disorders by up to 2.33 times compared to staff in other wards. The study also revealed a lack of on-the-job training for nursing staff in preventing musculoskeletal disorders. Given that these disorders are preventable, it is essential to educate staff on the proper use of body mechanics and to modify the work environment (22).

In their cross-sectional descriptive study conducted in Kenya, Olutende et al. (2022) employed quantitative methods. The objective of the study was to investigate the risk factors for work-related musculoskeletal disorders among nurses in Kakamega County. The study population comprised 130 nurses who were randomly selected. The researchers employed a self-administered questionnaire to collect the necessary information. The study revealed that

more than 76.9% of the nurses experienced significant work-related musculoskeletal disorders (WRMSD) when attending to a high number of patients and performing manual orthopaedic techniques. Furthermore, 81.5% of nurses experienced a major problem when they did not have a break during working hours. The study identified a significant association between inadequate rest periods or breaks during working hours, prolonged standing or sitting, and work-related injuries. The study identified several risk factors for WRMSD among the participants, including prolonged sitting or standing, treating a high volume of patients, and handling or transferring patients. The study recommends implementing changes to work techniques, utilising lifting equipment, regularly changing the tasks of each staff member, reducing the excessive number of patients that each nursing staff member has to manage, taking frequent breaks to avoid awkward postures, and avoiding repetitive tasks or tasks that are defined as difficult (23).

In a quasi-experimental study conducted by Rakhshani et al. (2024) in Iran, 120 nurses working in a hospital were divided into two groups (an experimental and a control group). The objective of the study was to define an educational intervention based on the PRECEDE-PROCEED model to investigate its effects on a group of nurses regarding preventive behaviours concerning musculoskeletal disorders. Following the collection and analysis of the data, it was determined that the educational intervention should utilise a variety of teaching methods in the educational sessions, involve researchers and nurses in its implementation, and be designed based on the problems that most nurses face as a result of their work. The study concluded that educational interventions grounded in the PRECEDE-PROCEED method yielded enhancements in knowledge, attitudes, training, reinforcement structures, and nurses' behaviour. The necessity of education in a broader dimension and with different means is becoming increasingly evident in society, given the important role that health education plays in encouraging behaviours related to musculoskeletal disorders in nurses and the importance of observing related behaviours in preventing long-term complications (24).

Conversely, a study undertaken by Soler-Font et al. (2019), conducted in Barcelona, Spain, encompassed 473 participants, comprising nurses and nursing assistants, who were methodically divided into eight groups. The objective of this study was to evaluate a multifaceted intervention for the prevention and management of musculoskeletal disorders in two hospitals. The measurement of musculoskeletal pain perceived by the participants themselves was undertaken by means of a validated Spanish adaptation using the standardized Nordic questionnaire for the analysis of musculoskeletal symptoms by the ERGOPAR method, during a six- and 12-month follow-up. Furthermore, work functioning was measured after six and 12 months using the Work Role Functioning Questionnaire-Spanish Version (WRFQ-SpV). The study concluded with the recommendation of multifaceted interventions focused on the prevention and management of musculoskeletal disorders in nursing staff and other professional groups. The intervention in question was found to be effective in reducing neck, shoulder and back pain. It is further suggested that interventions to reduce and manage disorders require a multifactorial approach, encompassing the three levels of prevention (25).

Kurowski et al. (2017) conducted a post-intervention study in the United States with the objective of reducing the incidence and cost of work-related musculoskeletal disorders. This study comprised a substantial number of nurses and healthcare assistants, as well as nursing homes, with a total of 11,603 participants. The analysis of the data revealed that the purchase of mechanical lifting equipment, the training of workers, and the availability of use and maintenance procedures were all found to be of considerable importance in the prevention of WRMSD among nurses in these care centres. The implementation of these measures resulted in a notable decline in workers' compensation claims, ranging from 11% to 14%, in the intervention group during the first and second years.

## CONCLUSIONS

The findings of this literature review indicate that work-related musculoskeletal disorders among nursing staff are influenced by numerous risk factors. The most frequently cited factors in the extant literature included the workplace environment, the physical demands of the work, the uncooperative nature of patients, the bending or transferring of patients, the duration of work hours, the absence of rest periods, the paucity of staff commitment or rotation, and the allocation of challenging tasks to a small number of staff members, resulting in a lack of prevention strategies. In all studies, changes in their work technique, the use of lifting equipment, changing tasks regularly, reducing the excessive number of patients treated in a day, taking breaks and avoiding difficult positions of cramp, repetitive work and other difficult tasks are recommended. Furthermore, health institutions are advised to implement preventive and rehabilitative measures to assist nurses in maintaining optimal musculoskeletal health. The



conclusion drawn from the study indicates that educational interventions can enhance nurses' knowledge, attitudes, and behaviours. The necessity of education in a broader dimension and with different means is becoming increasingly evident in society, given the importance of the role that health education plays in encouraging behaviours related to musculoskeletal disorders in nurses and the importance of observing related behaviours in preventing long-term complications.

**Conflict of interest.** The authors declare no conflicts of interest.

**Ethical consideration:** This study has been reviewed and approved by the Ethics Committee of the Department of Preclinical Subjects at the University of Shkodra "Luigj Gurakuqi", with document reference number 125/1. Date 05/07/2024, Shkodra, Albania.

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