Musculoskeletal Risk Assessment among Nurses in Patient Manual Handling in Hospital Wards – A Cross Sectional Study

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Abstract

Objectives: To find out the percentage of work-related musculoskeletal disorders (WRMSDs) among nurses and to perform a risk assessment of low back pain using the MAPO index in a tertiary care hospital.

Methods and Material: A cross-sectional descriptive study was conducted on 25 full-time nurses, working in a tertiary care hospital. Self-reported musculoskeletal discomfort was identified using a 25 item questionnaire which included the Nordik Questionnaire. The investigators administered the Movement and Assistance of Hospital Patients (MAPO) index in order to perform risk assessment of low back pain.

Results: Data was summarized using SPSS Version 14. Sixty-eight percent of the nurses reported work-related musculoskeletal disorders. Higher percentages of WRMSDs were more common among nurses who work with non-cooperative patients (71.42%) and semi-cooperative patients (75%). The major area of discomfort reported during activities of manual handling was the low back (44%). Years of experience among nurses also showed a strong positive correlation with WRMSDs. Risk stratification using MAPO index showed moderate to high risk for WRMSDs in all the hospital wards.

Conclusions: Percentage of self-reported WRMSDs among nurses was 68%, which cannot be ignored and has to be addressed. Self-reported pain and discomfort were more prevalent in low back and was related to various factors like age of nurse, years of experience, type of patients handled, patient's assistance during the activity, and the type of ward. Evaluation using MAPO index showed that the nurses were exposed to moderate to high risk for WRMSDs.

Introduction

Nursing is a profession that involves 24-hour patient care. This includes activities ranging from dressing, bathing, lifting, and shifting activities. Direct nursing care around the world has reported high number of work-related musculoskeletal disorders (WRMSD) [1]. Most of the WRMSD involve injuries at the back, but also include other sites such as neck, arm, shoulder, wrist, and knee disorders [2].

For nursing personal, risk factors for WRMSD involve activities like turning, lifting, bathing, dressing, and transfers. These tasks are enough to cause WRMSD, other risk factors include weight of the patient being moved, frequency of handling, and level of postural awkwardness required duration of the job [1]. Adoptions of incorrect postures, associated with forward flexion of trunk and lateral rotation of trunk, are also high-risk postures.

The different manoeuvres in patient manual handling have consistently been related to low back pain and injuries which are perceived to be most stressful [3]. Several authors have stated that the prevalence rate of LBP in nurses to be 45%-58% [4-6]. Studies have shown that one in six nurses (about 17%) will suffer from LBP each year [7]. Back pain among nurses are more than half (ie, 56%) of a permanent nature [8].

There are several observational methods to assess the risk of WRMSD; for example, rapid entire body assessment (REBA) [9], as proposed by the Royal College of Nursing 1996 and Owako Working Posture Assessment System (OWAS). The Movement and Assistance of Hospital Patients (MAPO) index has been used in many Italian hospitals for both acute and long-term stay patients for a number of reasons. It allows the detailed analysis of the main risk determinants for low back pain in nurses, comparison of different wards, and comparison of both pre- and post-interventional plans. Also, it can be used for simulating different kinds of intervention, and finally, it is a simple and rapid technique [10]. The first analysis of association between exposure level and low back pain permitted the definition of some classes, according to the well-known traffic model, for this index-absent or negligible risk ranges from 0.5-1.5, moderate risk

ranges from 1.5-5, and high risk values exceeding five.

The MAPO index has various components. They are Disabled Patient/Operators Ratio (NC/Op, PC/Op), Lifting Factor (LF), Minor Aid Factor (AF), Wheelchair Factor (WF), Environment Factor (EF), and Training Factor (TF). The MAPO index is calculated using the formula: MAPO= (NC/OP x LF + PC/OP x AF) x WF x EF x TF.

As proven in many studies, nurses are exposed to WRMSD, and there is no doubt that these disorders are multifactorial. There exists dearth regarding the prevalence and risk factor evaluation studies of work-related low back pain among nurses in India. Therefore, the need for the study is to identify nurses who are at risk (using the MAPO index), thereby helping in developing prevention strategies in the form of education, exercises, engineering controls, and administrative controls. An analysis of the situation by risk stratification can give further insight and help to develop an interventional program at the earliest. The objectives of this study were to find out the percentage of work-related musculoskeletal disorders among nurses and to perform risk assessment of low back pain using the MAPO index in a tertiary care hospital in India.

Materials And Methods

A cross-sectional study was conducted on 25 nurses, working in a tertiary care hospital in Udupi District, Karnataka, India. The only inclusion criterion was they should be full-time nurses with work experience more than six months. The exclusion criteria was the presence of any musculoskeletal disorders before becoming a full-time nurse, nurses working in outpatient departments, operation theatres, nursing supervisors, students, interns, and postgraduates. Ethical clearance for the study was obtained from Manipal University Ethical Committee.

This study was carried out after obtaining clearance from the medical superintendent and the nursing superintendent. An informed consent was obtained from all of the participants. The 25 item questionnaire, which included the Nordik Questionnaire, was given to the nurses to complete. The MAPO index was filled ward-wise by the investigator, taking into consideration all the components in the index mentioned earlier. SPSS version 14 and descriptive statistics were used to summarize the data.

Results

Seventeen out of twenty five nurses reported WRMSDs, i.e. 68%. Correlation of age and WRMSD showed a moderate correlation of 0.449. Table 1 shows the relation between the type of ward and the self-reported WRMSDs by the nurses.

Ward	Total Number of Nurses	WRMSD +ve	WRMSD -ve	Percentage of Nurses with Positive WRMSDs
ICU	7	3	4	42.87%
Cardiac	2	1	1	50%
Surgery	6	6	0	100%
Medicine	2	1	1	50%
Neurosciences	2	2	0	100%
Orthopedics	6	4	2	66.66%

TABLE 1: Shows the relationship between the type of ward and the self-reported WRMSD by the nurses.

Table 2 shows the relation between the type of patients in the wards, grouped into three major categories, and the total number of nurses who reported WRMSD during manual handling of the patients. A lower percentage of self-reported WRMSD was seen with the cooperative patients.

Patient Type	Total Number of Nurses	WRMSD +ve	WRMSD -ve	Percentage of Nurses with Positive WRMSDs
Non co-operative	7	5	2	71.42%
Semi co-operative	4	3	1	75%
Co-operative	14	9	5	64.28%

TABLE 2: Shows the relationship between the type of patients in the wards grouped into three major categories and the total number of nurses who reported WRMSD during manual handling of the patients.

A lower percentage of self reported WRMSD was seen with the co-operative patients.

Table 3 depicts that out of 25 nurses, 72.27% reported WRMSD while performing manual handling of patients who contributed to less than 50% in the transfers, bed making, etc.

Assistance from Patients	Total Number of Nurses	WRMSD +ve	WRMSD -ve	Percentage of Nurses with Positive WRMSDs
<50%	11	8	3	72.27%
>51%	14	9	5	64.28%

TABLE 3: Out of 25 nurses, 72.27% reported WRMSD while performing manual handling of patients who contributed to less than 50% in the transfers, bed-making, etc.

Table 4 shows that the major area of discomfort reported during activities of manual handling was clearly the low back (44%), followed by shoulders 12%.

Area of Discomfort	Number of Nurses	Percentage of Nurses
Low back	11	44%
Both the shoulders	3	12%
Neck	1	4%
Knee	1	4%
Right shoulder	1	4%

TABLE 4: The major area of discomfort reported during activities of manual handling was clearly the low back. (44%)

Table 5 shows that all the nurses with more than five years of experience reported WRMSDs.

Years of Experience	Total Number of Nurses	WRMSD +ve	WRMSD -ve	Percentage of Nurses with Positive WRMSDs
<5	15	8	7	53.33%
6-10	1	1	0	100%
11-15	3	3	0	100%
>15	5	5	0	100%

TABLE 5: All nurses with more than five years of experience reported WRMSDs.

Table *6* depicts ward-wise risk stratification of nurses; all the wards, except cardiac wards, reported high risk for WRMSDs.

Ward	MAPO Index	Risk Stratification
ICU	7.875	HIGH
Cardiac Wards	3.87	MODERATE
Surgery	9.625	HIGH
Neurology	25.98	HIGH
Medicine	9	HIGH
Orthopedics	5.53	HIGH

TABLE 6: All the wards, except the cardiac wards, reported a high risk for WRMSD mainly back pain.

Table *7* shows the association between MAPO index and WRMSDs in different wards.

Ward	MAPO Index	WRMSD
ICU	7.875	4
Cardiac Wards	3.87	4
Surgery	9.625	4.5
Neurology	25.98	7.5
Medicine	9	6
Orthopedics	5.53	3.33

TABLE 7: Association between MAPO index and WRMSDs in different wards.

Discussion

The aim of the study was to find out the musculoskeletal risk among nurses while performing manual handling of patients. A questionnaire was completed by 25 nurses working in various wards of a tertiary care hospital in India. The percentage of discomfort was 68% obtained from the study.

Age showed a moderate correlation with WRMSD. The age variation of the study group was between 21 to 48 years with maximum participants in the age group of 21 to 25 years. The major area of discomfort reported was the low back, i.e. 44%; this is in line with the studies done by Knibbe JJ and Friele RD 1996, Garg, et al.

1991, and Daltroy, et al. 1997 where they reported the prevalence rate of low back pain in nurses to be 45%-58% [4-6]. From the previous studies, there have been various risk factors which have supported that the lower back is the region that sustains maximum stress. The activities performed by the nurses are bed-making and transfers where the level of postural awkwardness is in the form of improper biomechanics (hip and spinal flexion without knee flexion). Increased complaints can also be attributed to long standing hours, majority of nursing population being female, and anthropometric factors coupled with unsuitable environment [11].

A clear relation exists between WRMSD and designation and WRMSD and years of experience. A higher percentage of WRMSD was seen in in-charge nurses who have work experience of more than 10 years. A risk assessment done according to the MAPO index concluded that all wards, except the cardiac wards, were HIGH risk. The MAPO index states the risk of the ward. The major component that influenced the score was the nurses to patient ratio. In the cardiac wards, the ratio was low in comparison to the ICU and neurosciences where the ratio was higher, majorly due to the patient status.

An association was discovered between the WRMSD and the MAPO index among the nurses of the respective wards. An association exists in neurosciences and medicine wards, showing a VAS of 7.5 and MAPO index risk of 25.98 in the neurosciences ward and a VAS of 6 and MAPO index risk of 9 in the medicine wards.

A further discussion was made regarding the relationship between the patient type and back pain.

Nurses grouped the patients in the ward where they are working into the following groups: non-cooperative, semi-cooperative and cooperative. Nurses who grouped their patients into the non-cooperative group complained of 71.42% and the area of discomfort as low back. Also, a higher percentage of discomfort (75%) was also seen in nurses who grouped their patients into the semi-cooperative group. This could be attributed to the following reasons: inappropriateness and sustenance of a posture while performing activities like back and hip flexion, improper lifting technique, absence of lifting devices, and space constraints.

The major limitations to attaining substantial evidence were a small sample size, non-compliance by the nurses, and lack of time given by the nurses.

Conclusions

A conclusion can be drawn from the study that nurses are subjected to various WRMSDs, especially back pain. It is also related to various factors like age of nurse, years of experience, type of patients handled, patient's assistance during the activity, and the type of ward.

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study. The Institutional Ethical Committee, Manipal College of Allied Health Sciences, Manipal University, Manipal issued approval # 103/2011. This paper adheres to the ethical guidelines and ethical clearance was obtained from Institutional Ethical Committee, Manipal College of Allied Health Sciences, Manipal University, Manipal in 2011. Written informed consent was obtained from all the participants of this study. **Animal subjects:** All authors have confirmed that this study did not involve animal subjects or tissue. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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