Work-related musculoskeletal disorders in nurses working in South African spinal cord rehabilitation units

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1. Introduction

Musculoskeletal disorders (MSDs) are the leading cause of work-related injuries among nurses (Chung et al., 2013) and are associated with pain, loss of function and disability (Sorour & El-Maksoud, 2012). Musculoskeletal disorders derive from physically demanding tasks such as helping patients to adjust position, maintaining a bent forward twisted posture and lifting heavy patients (Cilliers & Maart, 2013; Jellad et al., 2013; Punnett & Wegman, 2004). Musculoskeletal disorders can be inflammatory and degenerative disorders affecting the muscles, tendons, ligaments, joints, cartilage, peripheral nerves, supporting blood vessels or spinal discs (Anap, Iyer, & Rao, 2013; Punnett & Wegman, 2004). In this study, we classified work-related MSDs as any of the above-mentioned injuries occurring on duty and during patient handling activities.

In the United States, work-related injuries occur twice as often among nurses than among the general population, with more than half of those being MSDs (Bhimani, 2016). Nurses have to care for their patients continuously, making nurses more vulnerable to musculoskeletal strains and disorders (Attar, 2014; Himmiakaye & Bamishaiye, 2012). Aside from being physically demanding, nurses also work in stressful environments, which may lead to risky behaviours resulting in work-related MSDs (Cilliers & Maart, 2013; Israni, Vyas, & Sheth, 2013). Nurses mostly report lower back injuries and associated pain, with frequencies ranging from 44.1% (Tinubu, Mbada, Oyeyemi, & Fabunmi, 2010) to 74.5% (Jellad et al., 2013). Lower back pain is often attributed to nurses having to stand for long periods, lifting and moving patients, working in awkward postures and pushing or pulling heavy loads (Anap et al., 2013; Attar, 2014; Chung et al., 2013; Jellad et al., 2013; Munabi, Bwembo, Kitara, Ochieng, & Mwaka, 2014). Nurses working with rehabilitation patients (Bhimani, 2016), obese or overweight patients (Choi & Brings, 2016) and with patients that have restricted movement may be especially prone to work-related MSDs. Caring for rehabilitation patients is especially demanding, since they have to be moved around for multiple activities in a day and nurses often don’t have enough time to meet the busy schedules of such patients (Bhimani, 2016). The occurrence of work-related MSDs therefore needs to be contextualised (Bhimani, 2016) to understand patterns of injury amongst nurses.

Patients with spinal cord injuries (PWSCI) are functionally dependent on nursing staff to assist with activities such as transfers. The PWSCI also need to be frequently and regularly repositioned to prevent secondary complications such as pressure sores and chest infections. Nurses working in spinal cord injury rehabilitation units (NuSCI) routinely have to lift heavy loads as part of their rotation duties. Patients with spinal cord injuries are often heavier than other patients and the need to lift and turn them may mean that NuSCI are more prone to injury than nurses in other settings. These highly physical work tasks put NuSCI at risk of developing sudden, acute and gradual as well as chronic work-related MSDs. Demographic characteristics, such as weight, height and years of professional experience, may also influence the development of work-related MSDs (Engels, van der Gulden, Senden, & van’t Hof, 1996).

Work-related MSDs in nurses are a serious health workforce challenge and the health care system cannot afford to lose nursing staff to extended absenteeism, other employment or early retirement. Intent to leave the nursing profession has been associated with the incidence of work-related MSDs (Fochsen, Hagberg, Toomingas, & Lagerström, 2006). Although a number of studies have been done to establish the prevalence of work-related MSDs among nurses worldwide, little information is available on the prevalence of work-related MSDs among NuSCI in the City of Tshwane metropolitan area. We determined the prevalence of work-related MSDs among NuSCI; the most commonly affected body regions; the perceived job risk factors and coping strategies in the prevention of work-related MSDs.

2. Methods

We conducted a quantitative, descriptive cross-sectional study, sampling four spinal cord rehabilitation units in the City of Tshwane metropolitan area simultaneously.

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2.1 Sample size and sampling method

We selected participants using a non-probability, total population sampling method. The population comprised of 86 NuSCI. Previous studies on work-related MSDs among nurses used sample sizes ranging from 118 to 212 (Anap et al., 2013; Tinubu et al., 2010). These studies did not target a specialty area of nursing. In South Africa, nurses working with PWSCI constitute a relatively small percentage of nurses. All NuSCI at the four rehabilitation centres were considered for inclusion. Student nurses in their first year of study were excluded.

3. Questionnaire

We collected data using a four section self-reporting questionnaire. The questionnaire was adapted from the Nordic questionnaire (Kuorinka et al., 1987) for this particular study by adding three questions to the demographic section (Section A) to suit the specific population in this study. Section D was adapted to include a four-part Likert scale compelling participants to think about their answer.

- In Section A, participants were required to complete questions regarding demographic characteristics such as age, gender, weight, height, rank and level of education.
- Section B requested information regarding occupational health in nursing practice and sought information regarding work status and setting, years of practice, patient population and nursing activities. This section also includes a modification of the standardised Nordic questionnaire (Kuorinka et al., 1987), which consists of questions on nine different body areas.
- Section C contains elements on perceptions of job risk factors, such as performing repetitive tasks and working in awkward positions.
- Section D requested information on coping strategies employed by nurses seeking to reduce the development of work-related MSDs.

The Nordic questionnaire has been adapted for use in other studies (Anap et al., 2013; Nkhata et al., 2015; Tinubu et al., 2010). We conducted a pilot study to pre-test the adapted questionnaire to evaluate face and content validity and feasibility, time and adverse events. We made minor adaptations to improve ease-of-use and to ensure clarity. We removed the following redundant questions in Section A: current working experience with PWSCI is 9.87 ± 7.55 years. The mean amount of professional working experience with PWSCI was 9.87 ± 7.55 years. The mean amount of professional working experience with PWSCI was 9.87 ± 7.55 years.

5. Informed consent

All participants received a preface outlining the research in the information leaflet and consent form together with the questionnaire. All the information and the questionnaires were presented in hard copy format and in English. Participants had the opportunity to request information via the contact details made available in the information leaflet. Participants were not obligated or forced to take part in the study. Participation was completely voluntary and participants could refuse to take part in the study or leave at any time without penalty. By completing the questionnaire, participants automatically gave informed consent. Once the completed questionnaires were in the possession of the researchers, the participants could not recall their consent and therefore the information obtained from the questionnaires were used in the study.

6. Results

We distributed 86 questionnaires to NuSCI. We collected 61 questionnaires representing a 70.9% return rate. We excluded two questionnaires that were completed by care-workers and not by nurses. The sample comprised of 49 female and 10 male NuSCI. As shown in Table 3, the mean age, height and weight of NuSCI were 36.73 ± 9.33 years, 1.59 ± 0.16 m, and 77.09 ± 15.42 kg respectively. Regarding rank, 44.1% were enrolled nursing assistants; professional nurses and enrolled nurses comprised 22.0%, unit managers 5.1% and student nurses 1.7%. The mean amount of professional working experience with PWSCI was 9.87 ± 7.55 years. The mean amount of hours per week that the nurses spent in direct spinal cord injured patient care were 40.14 ± 6.39 h (Table 1). Of the NuSCI, 59.3% had previous training on kinetic handling and how to prevent occupational hazards.

In this study, 57.6% (n = 34) of NuSCI experienced work-related ache, pain, discomfort or injury that lasted for more than three days in the last 12 months. Two-thirds (61%, n = 36) of NuSCI reported that they had experienced a work-related ache, pain, discomfort or injury that lasted for more than three days, and was not within the previous 12 months. As shown in Table 2, 12-month prevalence rates of work-related MSDs were highest in the lower back (73.53%), followed by shoulders (41.18%), knees and ankles (26.47%), thoracic back (23.53%), wrists/hands (17.65%), hips/thighs (17.65%), neck (8.82%), and elbows (2.94%).

Table 3 displays what NuSCI perceive to be job risk factors. Bending or twisting your back in an awkward way was most commonly perceived to be a major problem (61%). Almost half (54.2%) of NuSCI perceived treating an excessive number of patients, working in the same position and continuing to work while injured or hurt to be major
problems contributing to work-related MSDs.
Nurses caring for PWSCI mostly coped with work-related MSDs by adjusting the plinth/bed height to stretch and change posture (68%).

Table 3
Perceived job risk factors for work-related MSDs by NuSCI (n = 59).

<table>
<thead>
<tr>
<th>Perceived job risk factors</th>
<th>Major problem (%)</th>
<th>Minimal to moderate problem (%)</th>
<th>No problem (%)</th>
<th>Not documented (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending or twisting your back in an awkward way</td>
<td>61.0</td>
<td>27.1</td>
<td>8.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Treating an excessive number of patients in one day</td>
<td>54.2</td>
<td>35.6</td>
<td>6.8</td>
<td>3.4</td>
</tr>
<tr>
<td>Working in the same positions for long periods (Standing, bend over, sitting, kneeling)</td>
<td>54.2</td>
<td>32.2</td>
<td>10.2</td>
<td>3.4</td>
</tr>
<tr>
<td>Continuing to work while injured or hurt</td>
<td>54.2</td>
<td>35.6</td>
<td>8.5</td>
<td>1.7</td>
</tr>
<tr>
<td>Carrying, lifting or moving heavy materials or equipment (e.g. continuous passive motion machines)</td>
<td>45.8</td>
<td>37.3</td>
<td>10.2</td>
<td>1.7</td>
</tr>
<tr>
<td>Not enough rest breaks or pauses during the workday</td>
<td>40.7</td>
<td>42.4</td>
<td>11.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Lifting or transferring dependent patients</td>
<td>40.7</td>
<td>49.2</td>
<td>8.5</td>
<td>5.1</td>
</tr>
<tr>
<td>Inadequate training on the injury prevention</td>
<td>39.0</td>
<td>40.7</td>
<td>13.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Working with confused or agitated patients</td>
<td>37.5</td>
<td>39.0</td>
<td>11.9</td>
<td>6.8</td>
</tr>
<tr>
<td>Performing the same task over and over</td>
<td>37.3</td>
<td>37.3</td>
<td>18.6</td>
<td>6.8</td>
</tr>
<tr>
<td>Unanticipated sudden movement or fall by patient</td>
<td>37.3</td>
<td>47.5</td>
<td>6.8</td>
<td>8.5</td>
</tr>
<tr>
<td>Working in awkward and cramped positions</td>
<td>35.6</td>
<td>39.0</td>
<td>16.9</td>
<td>8.5</td>
</tr>
<tr>
<td>Working near or at your physical limits</td>
<td>28.8</td>
<td>50.8</td>
<td>15.3</td>
<td>5.1</td>
</tr>
<tr>
<td>Work scheduling (overtime, irregular shifts. length of workday)</td>
<td>28.8</td>
<td>39.0</td>
<td>25.4</td>
<td>6.8</td>
</tr>
<tr>
<td>Reaching or working away from your body</td>
<td>27.1</td>
<td>55.9</td>
<td>10.2</td>
<td>6.8</td>
</tr>
<tr>
<td>Performing manual orthopaedic techniques (joint mobilisations. soft tissue mobilisations)</td>
<td>23.7</td>
<td>47.5</td>
<td>11.9</td>
<td>16.9</td>
</tr>
<tr>
<td>Assisting patients during gait activities</td>
<td>22.0</td>
<td>47.5</td>
<td>18.6</td>
<td>11.9</td>
</tr>
</tbody>
</table>

Very few NuSCI warmed up or stretched before performing their nursing duties (Table 4).

7. Associations

Nurses who had lower back pain in the last 12 months were more likely to identify bending or twisting your back in an awkward way as a major problem (F = 3.207; p = 0.048). Nurses who experienced any work-related MSDs were more likely to perceive not having enough staff as a major problem (F = 3.611; p = 0.033). This association was confirmed by a post-hoc Scheffe test that revealed a statistically significant association between NuSCI not having enough staff and experiencing a work-related MSDs (M = 0.463, SD = 0.5897). A similar association was found between not having enough staff and experiencing work-related MSDs at some point in their occupational lives (M = 0.789, SD = 0.4132).

Nurses who reported a high prevalence of work-related MSDs in the last months were more likely to report working at or near their physical limits as a major problem (F = 6.013; p = 0.004). Nurses who worked more hours in a week were more likely to identify that continuing to work while injured was a major problem (F = 2.225; p = 0.047). Female nurses were more likely to request help with lifting heavy patients in order to cope (F = 6.468; p = 0.014).

8. Discussion

In our study, more than half (57.6%) of NuSCI experienced work-related ache, pain, discomfort or injury that lasted for more than three days in the last 12-months. This prevalence rate is comparatively less than injuries reported for nurses from India (81.0%), Saudi Arabia (85.0%), Uganda (80.8%), Zambia (68.9%) and Nigeria (78%) (Anap et al., 2013; Attar, 2014; Munabi et al., 2014; Nkata et al., 2015; Tinubu et al., 2010). The injury rates in different countries may be attributed to differing workloads, the availability of equipment and support from management.

Nurses working with PWSCI in this study mostly reported lower back complaints in the last 12 months, followed by complaints of the shoulders, knees and ankles or feet. These results are similar to those reported by Tinubu et al. (2010) in Nigeria, who found the lower back to be the most commonly affected body region (44.1%), followed by the neck (28.0%), and knees (22.4%). Furthermore, Attar (2014) found similar results with the lower back (65.7%), ankles/feet (41.5%) and
shocks (29.0%) being the top three most affected body regions. This contrasts with a study done by Nkhata et al. (2015), where researchers found ankles and feet to be the most commonly affected body region with a frequency of 54.8%. Despite the similarities, nurses in our study reported higher frequencies of lower back work-related MSDs (73.53%) compared to other studies; 48.2% (Anap et al., 2013), 65.7% (Attar, 2014) and 44% (Tinubu et al., 2010). The high frequency of lower back pain in NuSCI (this study) may be attributed to the repetitive patient handling tasks required of this specialised group of nurses and a high workload.

The NuSCI in this study reported that treating an excessive number of patients per day was a major problem and thus the second highest perceived job risk factor (54.20%). The high workload may arise from an unbalanced nurse to patient ratio due to a recognised shortage of nurses. Being short-staffed may mean that NuSCI have to work longer hours, thus putting them at a higher risk of developing work-related MSDs or worsening existing injuries. We found that NuSCI who worked longer hours were also more likely to report that continuing to work while injured was a major problem (45.8%), they mostly asked for help to handle a heavy patient. This suggests that although NuSCI in this study perceived carrying heavy materials as a major problem (45.8%), they mostly asked for help to handle heavy patients. Nurses adopt coping strategies during patient handling tasks to compensate for, and to prevent aches, pain, discomfort or injury related to work-related MSDs (Breakwell, 2015).

Nurses caring for PWSCLI employed various coping strategies. Nurses mostly adjusted bed height, asked for help, modified their position or chose to perform tasks that would not put strain on their injuries. These coping mechanisms are also employed by nurses in other settings (Anap et al., 2013; Nkhata et al., 2015; Tinubu et al., 2010). Nurses employed other strategies to a lesser extent, including using different parts of the body in administering nursing procedures (e.g. Nkhata et al., 2015). Nurses in our study were unlikely to stop or restrict their activities if their pain was aggravated, unlike nurses from Nigeria (Tinubu et al., 2010). Nurses from South Africa (this study; Altmann, 2010) seem to have a tendency of ignoring pain and continuing to work regardless of the symptoms. We noticed that interventions aimed at preventing work-related MSDs among nurses were in place in the rehabilitation centres where we conducted our research. Kinetic handling and ergonomics in the workplace are regularly addressed; but these interventions seem to have little effect on the incidence and prevalence of work-related MSDs among nurses.

Nurses working in understaffed units seem to link the incidence of work-related MSDs to being understaffed and under-equipped (64.4% of NuSCI, this study). A ‘catch-22’ situation develops when there is a high prevalence of work-related MSDs and not enough nurses to fill in for injured colleagues. Nurses who are capable of doing strenuous tasks have to fill in, often resulting in a higher workload and a greater risk for work-related MSDs. Work-related MSDs lead to absence from work and reduced work input (Hinmikaiye & Bamishaiye, 2012) placing more strain on the rest of the staff, as they must take on added responsibility (Cilliers & Maart, 2013).

9. Practical implications

Work-related MSDs are a serious health workforce challenge and the health care system cannot afford to lose nursing staff to extended absenteeism, other employment or early retirement. This study identifies the body areas most affected by work-related MSDs as well as the risk factors of work-related MSDs. Strategies to mitigate lower back pain and shoulder injuries are vitally important as these injuries require long recovery times. Patients with high acuity need more attending nurses to relieve the workload of nurses and prevent work-related MSDs.

10. Limitations

The questionnaire was only in English, which may have been a potential reason for NuSCI not completing all questions, perhaps due to lack of understanding. It was noted that NuSCI do not have much spare time during work hours and got agitated when asked to complete a 10 min questionnaire. We selected the four rehabilitation centres based on their accessibility. Our results are not generalizable outside of our study setting. Our conclusions are also based on a cross-section of nurses and our results might not be a true representation of the problems experienced at these centres, since data was not collected from retired NuSCI or from nurses that changed their area of speciality.

11. Recommendations

The researchers recommend compiling a shorter questionnaire for NuSCI to ensure a higher questionnaire return rate and to ensure that less time is spent away from their work or leisure time. Future studies can be expanded to rehabilitation centres in other provinces of the country. Future studies can also be extended over a longer period of time to accommodate NuSCI who are on prolonged leave of absence or on a rotation basis to non-rehabilitation wards. This study identified a possible continuous cycle where NuSCI experienced a high workload, placing them at an increased risk of developing work-related MSDs. Once injured, NuSCI would be away from work to recover, leading to shortage of staff resulting in an increased workload for the NuSCI on duty. The NuSCI who work through the pain may not be able to fully perform their duties adequately, resulting in poor execution and quality of work. It is therefore recommended that the employer take steps to mitigate the multiple challenges faced by NuSCI. Various strategies may need to be put in place by the employer to ensure that NuSCI are
adequately equipped to lower the risk of injury while still providing good services to PWSCI.

12. Conclusion

The most common work-related MSDs in NuSCI (this study) were lower back pain, followed by injuries to the shoulders, knees and ankles/feet. The most common perceived job risk factor was bending or twisting your back in an awkward way, which is a common movement used during patient-handling tasks, especially in PWSCI. The NuSCI in this study mostly adjusted bed height to allow for stretching and changing posture to prevent work-related MSDs. The NuSCI felt that they were working in units with a shortage of staff and were working at their physical limits. Nurses working with PWSCI need to be physically able to carry out their daily tasks. Physiotherapy interventions such as core and proximal muscle strengthening; and upper and lower limb strengthening can help to prevent and treat work-related MSDs. Nurses should also receive training on how to lift and transfer PWSCI. It is important that education on ergonomics and kinetic handling is tailored to each individual setting for effective prevention of work-related MSDs.

Conflict of interest

The authors declare that they have no personal or financial relationship(s) that may have influenced them in writing this article.

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Ethical considerations

This study was approved by the Faculty of Health Science Research Ethics Committee of the University of Pretoria (Clearance number, 532/2015), and by management of the respective faculties. The informed consent forms were separate to the questionnaires to ensure that the participants completed the forms anonymously. This study had no foreseeable risks, as there were no interventions with potential adverse effects.

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Appendix A. Supplementary data

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