Work-related musculoskeletal disorders among registered general nurses: a case of a large central hospital in Harare, Zimbabwe

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Abstract

Objective: Worldwide, work-related musculoskeletal disorders (WMSDs) are a common cause of morbidity affecting occupational individuals such as health-care professionals. However, nothing is known about WMSDs in hospital nurses in Zimbabwe. This study was conducted to provide cross-sectional evidence of the 12-month prevalence, consequences and factors associated with WMSDs among 208 nurses at Parirenyatwa Group of Hospitals (PGH).

Results: The response rate for the study was 55.7%. The median age for the participants was 32.0 years (interquartile range = 29–36 years). The lifetime prevalence of WMSDs in nurses was 95.7% (n = 112). The first episodes were experienced in the first 5 years of working (n = 59, 52.7%). However, 82.1% (n = 96) nurses experienced WMSDs in the last 12 months. Low back pain was the most common WMSDs reported (n = 55, 67.9%). WMSDs were significantly associated with qualification attained, postgraduate ergonomic training and working experience. Overall, 87.5% (n = 84) nurses experienced at least one of the consequences of WMSDs. Cognisant of the limitations of the study, the present study found that WMSDs are a common occurrence among nurses at PGH. This creates a need for prompt hospital education programs aimed at raising awareness among nurses on the existence of WMSDs and the consequences at PGH.

Keywords: Prevalence, Associated factors, Nurses, Parirenyatwa Group of Hospitals

Introduction

Work-related musculoskeletal disorders (WMSDs) are a common cause of morbidity affecting occupational people such as health professionals [1–9]. Nurses are reportedly the hardest hit among health-care professionals [10–15]. Unabated, WMSDs interfere with productive work and quality of life [1, 4, 11, 13, 16, 17]. The prevalence of WMSDs among nurses varies between studies. Tinubu et al. [7] reported a prevalence of 78% among Nigerian nurses, with WMSDs associated with working in the same positions for long periods, lifting/transferring of patients and increased patient load. Yan et al. [11] observed a prevalence of 77.4% among Chinese nurses. Two systematic reviews cited poor patient transfer techniques, physical nature of the job, excessive repetition, and awkward postures as factors associated with WMSDs [13, 18].

Currently, there is dearth of literature documenting the magnitude, consequences and factors associated with WMSDs in Zimbabwean nurses as compared to other health professionals [19]. Surely, this does not insinuate that Zimbabwean nurses are immune to WMSDs. Although Zimbabwean nurses are not dissimilar from other nurses, contextual differences necessitate local studies to be conducted for relevant solutions to be proffered. Understanding the prevalence and factors associated with WMSDs among nurses is important for health policy administrators and health-care workers to curtail the existence of the problem. Therefore, this study was conducted to determine the 12-month prevalence, consequences and factors associated with WMSDs among nurses at PGH.
Main text

Study design, research setting and participants

A cross-sectional study was conducted at PGH targeting registered general nurses (RGNs). This hospital was chosen because it is the largest public hospital in Zimbabwe. It has 35 wards and for the purposes of this study were divided into medical, surgical, maternity and others (critical units i.e. intensive care unit, coronary care unit, burns unit, theatre unit, outpatient department, and casualty unit). The following parameters were used to estimate sample size using EPI info Statcalc: (i) total population of nurses at PGH (N = 762) (ii) expected prevalence of 80.8% [20], (iii) precision effect of 5%, (iv) design effect of 1 and (v) expected non-response rate of 14.6% [20]. Stratified proportional random sampling was then used to select 208 nurses in the various wards. Nurses above 18 years of age and freely willing to participate were included. RGNs had to have at least 1 year working experience at PGH performing clinical duties. Pregnant nurses and those who had given birth in the last 3 months were excluded [12].

Survey instrument

The questionnaire was largely researcher-developed and had few adopted questions from the Nordic Musculoskeletal Questionnaire (NMQ) [21–23]. The questionnaire was divided into four sections. The first section elicited information on socio-demographic and work-related information. Section A had questions on WMSDs and body regions affected. Section B elicited data on the consequences of WMSDs. Section C presented job tasks perceived to be associated with WMSDs. The questionnaire showed high Scale/Average Content Validity Index (S-CVI/Ave = 0.99) using the criteria outlined in literature [24, 25]. Thereafter, the questionnaire was translated into Shona following guidelines propounded by Sousa et al. [26]. The English questionnaire was evaluated for test–retest reliability among 30 nurses and showed kappa coefficients (k) ranging from 0.36 to 1, suggesting fair to perfect agreement according to Landis and Koch [27] (Additional file 1).

Procedure

This study adhered to the ethical principles under the Declaration of Helsinki [28]. Only the participants who read the information letters and agreed to sign the informed consent form participated. The questionnaires were self-administered with the option of returning them immediately or later. Those who completed later were given a maximum of 7 days to return the questionnaires. Telephonic and SMS reminders were sent within the 7 days reminding participants to complete the questionnaires.

Statistical analysis

Data was analysed using Statistica version 13.2. Normality for data was assessed using the Kolmogorov–Smirnov and Lilliefors test. Descriptive statistics were used to describe socio-demographic characteristics of the respondents. The Mann–Whitney U test checked for significant differences in the sum ranks of the ages by gender. Kruskal–Wallis One-way analysis of variance (ANOVA) checked for differences in the sum ranks in the years of experience for nurses by ward. Factors associated with WMSDs were evaluated using Chi square and the Fishers’ exact test (p ≤ 0.05).

Results

The response rate for the study was 55.7% (n = 117). The sample socio-demographic and work-related data are shown in Table 1. Age data was not normally distributed (K-S d = 0.13, p > 0.05; Lilliefors p < 0.01). The median age for the participants was 32.0 years (interquartile range, IQR = 29–36 years). There was a significant difference in the rank sum of the ages by gender (U = 453, p = 0.001). The median years of working experience for the nurses was 7.0 (IQR = 3–10) years. There was a significant difference in the median years of working between the sexes [U = 454, p < 0.01]. Females had more experience than males. Nurses in the maternity wards had more years of experience than the rest [H (3, N = 117) = 27.5, p < 0.01].

The “lifetime prevalence” of WMSDs among nurses was 95.7% (n = 112). The first episodes of WMSDs were experienced in the first 5 years of working by most nurses (n = 59, 52.7%). However, 96 (82.1%) nurses reported WMSDs in the last 12-months. There was no significant difference in the 12-month prevalence of WMSDs by gender [X²(1) = 3.42, p = 0.06] (Table 2). The 12-month prevalence was associated with repeatedly performing nursing tasks (p = 0.005), perceptions of treating large number of patients (p = 0.004), perceptions of repeatedly bending/twisting back (p = 0.03) and perceptions of lifting/transferring dependent patients and materials (p = 0.003) (Table 3). Most nurses frequently injured the back (n = 81, 84.3%) especially the lumber region (n = 55, 67.9%). Of the 96 nurses with WMSDs, 84 (87.5%) experienced at least one of the consequences of WMSDs. Most nurses (n = 67, 79.8%) had to take a day off from work. Sixty (71.4%) nurses had to consult a health-care professional at least once in the last 12-months. However, 63 (75%) reported taking pain medication for WMSDs.
Discussion

This study represents the first attempt to report on the prevalence of WMSDs among nurses in the country. This novelty renders comparison with local studies difficult as they targeted different occupational groups [19, 29, 30]. Nevertheless, innumerable studies have been conducted on WMSDs among nurses worldwide [7, 11]. The present study had relatively young nurses with the majority being females. The fact that the most participants were females was expected and reflects the gender distribution in the target population in the country. This finding is consistent with other findings [7, 11]. Most of nurses had attained a diploma as their highest qualification and had been working for <5 years. Almost all public hospitals in Zimbabwe train “diploma” nurses against one university training “degree” nurses. This largely accounts for the preponderance of diploma nurses in the study sample. The fact the majority of the nurses had <5 years of working experience is unclear but may suggest high turnover rates in nurses as reported elsewhere [31]. It is also possible that more experienced nurses at PGH had left in search of better opportunities or had changed duties to administrative or clerical.

This present study found that WMSDs are prevalent among nurses at PGH. These findings highlight an important and untapped occupational health issue at PGH. In addition, these findings provide support on calls on public health authorities to pay more attention on MSDs [32, 33]. These results are consistent with other studies [7, 10, 13, 15, 33–35]. The possible explanation for high prevalence of WMSDs in nurses at PGH is unclear. However, similar studies link the high prevalence among nurses to the physical nature of the job [7, 34–36]. The present study showed that perceived work-related factors such as performing nursing procedures repeatedly, treating large number of patients, bending/twisting the back and lifting/transferring of patients and equipment were associated with WMSDs among the nurses at PGH.

The present study showed that a sizeable proportion of nurses experienced the first episodes of WMSDs as student nurses. The majority, however, reported the first episode during the first 5 years of working. These findings are consistent with results of Tinubu et al. [7] and possibly indicate that the onset of WMSDs is indiscriminate from training to working years. This raises serious concerns. Also, the fact that most nurses experience first episode after qualifying calls for a need to evaluate working environment in an attempt to identify the possible work-related risk factors contributing to the development of WMSDs.

The present study showed that the 12-month prevalence of WMSDs among nurses at PGH was significantly associated with factors such as working experience, nursing qualification attained, and post-graduate ergonomic training. Surprisingly though, nurses with 5 or more years of working experience had WMSDs compared to those with less. These findings are consistent with findings of Tinubu et al. [7] but contradict others [15]. Yasobant and Rajikumar [15] postulated that junior workers are highly vulnerable to WMSDs because of the vigorous working

Table 1  Sample characteristics (N = 117)

| Variable                              | n (%)  |
|---------------------------------------|--------|
| Age (years)                           |        |
| 20–29                                 | 36 (30.8) |
| 30–39                                 | 60 (51.3) |
| 40–49                                 | 15 (12.8) |
| ≥50                                   | 6 (5.1) |
| Gender                                |        |
| Males                                 | 18 (15.4) |
| Females                               | 99 (84.6) |
| Marital status                        |        |
| Married                               | 81 (69.2) |
| Not married*                          | 36 (30.8) |
| Nursing qualification                 |        |
| Diploma                               | 103 (88.0) |
| Degree                                | 14 (12.0) |
| Working experience as a nurse (years) |        |
| ≤5                                    | 41 (35.0) |
| >5                                    | 76 (65.0) |
| Postgraduate ergonomic training        |        |
| Yes                                   | 50 (42.7) |
| No                                    | 67 (57.3) |
| Area of work                          |        |
| Medical wards                         | 54 (46.2) |
| Maternity wards                       | 46 (39.3) |
| Surgical wards                        | 7 (6.0) |
| Other wards*                          | 10 (8.5) |
| Ward rotations                        |        |
| Rotated                               | 66 (56.4) |
| Not rotated                           | 51 (43.6) |
| Ward rotations                        |        |
| Rotated                               | 66 (56.4) |
| Not rotated                           | 51 (43.6) |
| Have another job                      |        |
| Yes                                   | 25 (21.4) |
| No                                    | 92 (78.6) |
| First episode of WMSDs*               |        |
| Before training as a nurse            | 4 (3.6) |
| As a student nurse                    | 35 (31.2) |
| First 5 years of working              | 59 (52.7) |
| Above 5 years                         | 14 (12.5) |

*Not married meant not staying with a man or woman at the time of the study either single, widowed or divorced

*Critical units i.e. intensive care unit (ICU), coronary care unit (CCU), burns unit; theatre unit; outpatient department; casualty department

*Calculated out of 112 who indicated for lifetime prevalence of WMSDs
style as compared to senior nurses. However, the cumulative effects of repeated exposure to risk factors and complacency on adhering to safe working principles could possibly explain the higher prevalence in senior nurses in the present study.

The present study found that eight out of ten nurses with WMSDs reported back pain. Specifically, low back pain (LBP) was most prevalent. It may be because of bending/twisting the back in awkward ways, standing long periods when treating large number of patients, inadequate breaks and lifting/transferring dependent patients. These were the most perceived work-related factors identified by the nurses in the present study. These findings support established findings that LBP is the most prevalent MSDs in adults [17]. Also, cross-sectional studies investigating WMSDs among nurses reported consistent results [7, 10, 11, 37, 38]. Sheikhzadeh et al. [37] reported a LBP prevalence of 84% among US perioperative nurses. Fabunmi et al. [38] reported similar results among Nigerian nurses.

The present study also elicited consequences experienced by the nurses at PGH secondary to WMSDs. Approximately, nine out of ten nurses had at least one consequence to report. This shows that WMSDs are highly consequential among nurses. Other studies reported similar results [7, 39]. This finding calls for awareness programs on the existence of the problem at PGH to the nurses. The consequences involved taking a day off from work to allow for seeking of medical or non-medical treatment for the troubling symptoms.

### Table 2 Factors associated with WMSDs (N = 117)

| Characteristic                     | Frequency | WMSD n (%) | No WMSD n (%) | Chi square | p value |
|------------------------------------|-----------|------------|---------------|------------|---------|
| Gender                             |           |            |               |            |         |
| Male                               | 18        | 12 (66.7)  | 6 (33.3)      | X²(1) = 3.42 | 0.06    |
| Female                             | 99        | 84 (84.9)  | 15 (15.1)     |            |         |
| Age (years)                        |           |            |               |            |         |
| 20–29                              | 36        | 29 (80.6)  | 7 (19.4)      | X²(3) = 1.62 | 0.65    |
| 30–39                              | 60        | 51 (85.0)  | 9 (15.0)      |            |         |
| 40–49                              | 15        | 11 (73.3)  | 4 (26.7)      |            |         |
| ≥ 50                               | 6         | 5 (83.3)   | 1 (16.7)      |            |         |
| Marital status                     |           |            |               |            |         |
| Married                            | 81        | 67 (82.7)  | 14 (17.3)     | X²(1) = 0.08 | 0.78    |
| Not married                        | 36        | 29 (80.6)  | 7 (19.4)      |            |         |
| Nursing qualification              |           |            |               |            |         |
| Diploma                            | 103       | 94 (91.3)  | 9 (8.7)       | Fishers exact | 0.00    |
| Degree                             | 14        | 2 (14.3)   | 12 (85.7)     |            |         |
| Postgraduate ergonomic training     |           |            |               |            |         |
| Yes                                | 19        | 8 (42.1)   | 11 (57.9)     | X²(1) = 24.6 | 0.00    |
| No                                 | 98        | 88 (89.8)  | 10 (10.2)     |            |         |
| Work experience                    |           |            |               |            |         |
| ≤ 5 years (junior)                 | 41        | 29 (70.7)  | 12 (29.3)     | X²(1) = 5.49 | 0.02    |
| > 5 years (senior)                 | 76        | 67 (88.2)  | 9 (11.8)      |            |         |
| Having another job                 |           |            |               |            |         |
| Yes                                | 25        | 23 (92.0)  | 2 (8.00)      | Fishers exact | 0.12    |
| No                                 | 92        | 73 (79.3)  | 19 (20.7)     |            |         |
| Area of work                       |           |            |               |            |         |
| Medical ward                       | 54        | 44 (81.5)  | 10 (18.5)     | X²(3) = 0.48 | 0.92    |
| Maternity ward                     | 46        | 37 (80.4)  | 9 (19.6)      |            |         |
| Surgical ward                      | 7         | 6 (85.7)   | 1 (14.3)      |            |         |
| Other wards¹                       | 10        | 9 (90.0)   | 1 (10.0)      |            |         |
| Ward rotations                     |           |            |               |            |         |
| Rotated                            | 66        | 54 (81.8)  | 12 (18.2)     | X²(1) = 0.006 | 0.94    |
| Not rotated                        | 51        | 42 (82.4)  | 9 (17.6)      |            |         |

* Critical units i.e. intensive care unit (ICU), coronary care unit CCU, burns unit; theatre unit; outpatient department; casualty department
Table 3  Factors associated with WMSDs among nurses (N = 117)

| Work-related tasks                                      | Response | WMDS n (%) | No WMDS n (%) | Total | Chi square | p value* |
|---------------------------------------------------------|----------|------------|---------------|-------|------------|----------|
| Repeatedly performing certain nursing tasks             | Yes      | 75 (88.2)  | 10 (11.8)     | 85    | 8.07       | 0.005    |
|                                                         | No       | 21 (65.6)  | 11 (34.4)     | 32    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Treating a large number of patients each day            | Yes      | 68 (89.5)  | 8 (10.5)      | 76    | 8.11       | 0.004    |
|                                                         | No       | 28 (68.3)  | 13 (31.7)     | 41    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Not enough rest/breaks during the day                   | Yes      | 78 (82.1)  | 17 (17.9)     | 95    |            | 0.59     |
|                                                         | No       | 18 (81.8)  | 4 (18.2)      | 22    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Performing manual/handling techniques                   | Yes      | 36 (80.0)  | 9 (20.0)      | 45    | 0.21       | 0.65     |
|                                                         | No       | 60 (83.3)  | 12 (16.7)     | 72    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Working in awkward or cramped positions                 | Yes      | 65 (82.3)  | 14 (17.3)     | 79    | 0.01       | 0.93     |
|                                                         | No       | 31 (81.6)  | 7 (18.4)      | 38    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Working in the same position for long periods           | Yes      | 78 (84.8)  | 14 (15.2)     | 92    | 2.18       | 0.14     |
|                                                         | No       | 18 (72.0)  | 7 (28.0)      | 25    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Bending or twisting your back in an awkward way         | Yes      | 80 (86.0)  | 9 (14.0)      | 90    | 4.85       | 0.03     |
|                                                         | No       | 16 (47.1)  | 8 (52.9)      | 34    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Reaching or working away from your body                 | Yes      | 71 (82.6)  | 15 (17.4)     | 86    | 0.06       | 0.81     |
|                                                         | No       | 25 (80.6)  | 6 (19.4)      | 31    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Unanticipated sudden movements or falls by patients     | Yes      | 55 (87.3)  | 8 (12.7)      | 63    | 2.55       | 0.11     |
|                                                         | No       | 41 (75.9)  | 13 (24.1)     | 54    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Assisting patients during walking activities            | Yes      | 63 (84.0)  | 12 (16.0)     | 75    | 0.54       | 0.46     |
|                                                         | No       | 33 (78.6)  | 9 (21.4)      | 42    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Lifting or transferring dependent patients and heavy equipment and materials | Yes      | 69 (89.6)  | 8 (10.4)      | 77    | 8.74       | 0.003    |
|                                                         | No       | 27 (67.5)  | 13 (32.5)     | 40    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Working at or near your physical limits                 | Yes      | 77 (84.6)  | 14 (15.4)     | 91    | 1.83       | 0.18     |
|                                                         | No       | 19 (73.1)  | 7 (26.9)      | 26    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Overtime, irregular shift, length of workday            | Yes      | 89 (84.0)  | 17 (16.0)     | 106   |            | 0.11     |
|                                                         | No       | 7 (63.6)   | 4 (36.4)      | 11    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Lack of assistive devices and equipment                 | Yes      | 84 (82.4)  | 18 (17.6)     | 102   |            | 0.53     |
|                                                         | No       | 12 (80.0)  | 3 (20.0)      | 15    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |
| Malfunction of equipment e.g. beds that cannot be adjusted | Yes    | 64 (79.0)  | 17 (21.0)     | 81    |            | 0.72     |
|                                                         | No       | 32 (88.9)  | 4 (11.1)      | 36    |            |          |
|                                                         | Total    | 96         | 21            | 117   |            |          |

Significant values are in italics (p < 0.05)

* Actual p values calculated

* Fishers represents Fishers exact test
caused 71.4% of the nurses to consult a health practitioner at least once in the last 12 months resulting in getting medication for the symptoms.

In conclusion, the present study showed that WMSDs are prevalent and consequential among nurses at PGH. However, further studies with large sample sizes conducted at various hospitals investigating the prevalence, consequences and associated factors are warranted to better inform the situation on WMSDs among nurses in Zimbabwe.

Limitations
The results of this study should be interpreted cognisant of a number of limitations.

- The study had a low response rate compared to similar studies [7, 10–12, 20]. It is possible that non-participation bias could have influenced the observed results. Although frantic efforts were made to maximise the response rate, the low response rate was a methodological issue with the majority of the nurses failing to return the questionnaires despite several reminders. Therefore, this study should be considered as a pilot study documenting baseline findings on prevalence, consequences and work-related factors among PGH nurses in Zimbabwe.
- The study was purposively conducted at one public hospital in Harare, Zimbabwe. This affects generalisability of the results to nurses outside PGH.
- The cross-sectional nature of the study precludes deducing a cause-and-effect relationship [40]. In addition, reliance on self-reported data may engender inaccurate prevalence figures due effects of memory decay, forward telescoping and “social desirability” [12, 41].
- This study only investigated socio-demographic and work-related factors associated with WMSDs neglecting other factors that possibly may influence development of the condition.

Additional file

Additional file 1. Work-related musculoskeletal disorder instrument.

Abbreviations
CCU: coronary care unit; CI: confidence interval; ICU: intensive care unit; IQR: interquartile range; k: kappa coefficient; LBP: low back pain; MSDs: musculoskeletal disorders; NMQ: Nordic Musculoskeletal Questionnaire; PGH: Parirenyatwa Group of Hospitals; US: United States; WMSDs: work-related musculoskeletal disorders.

Authors’ contributions
MC and VM developed the concept and design of the study. VM submitted the proposal draft for ethical approval. VM conducted the data collection. MC drafted the manuscript and was the corresponding author. MC performed all the statistical analysis and interpretation of study results. JMD, NM and MM assisted in revising the manuscript for submission to a journal. All authors read and approved the final manuscript.

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Competing interests
The authors declare that they have no competing interests.

Availability of data and materials
The datasets generated and/or analysed during the current study are not publicly available due to the fact that the data is part of ongoing research. However, the data are available from the corresponding author on reasonable request.

Consent for publication
Not applicable as the manuscript does not contain any data from any individual person.

Ethics approval and consent to participate
Ethical approval was obtained from the Joint Research Ethics Committee for the University of Zimbabwe, College of Health Sciences and Parirenyatwa Group of Hospitals (JREC ref: 284/16) and the Medical Research Council of Zimbabwe (ref. MRCZ/B/1178). Written informed consent was sought from the participants. Clinical directors and the principal Matrons in charge of the wards at Parirenyatwa Group of Hospitals gave institutional approval and permission to have access to the nurses. Written informed consent was obtained from the participants prior to questionnaire administration. Participants were assured that the information gathered was to be used strictly for research and academic purpose only and was not going to be divulged indiscreetly to the authorities at PGH or any other person. In addition, participants were allowed to withdraw from the study at any time without any consequences to them.

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