Musculoskeletal Problems of the Neck, Shoulder, and Back and Functional Consequences in Nurses

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Background *Though musculoskeletal disorders (MSDs) are highly prevalent among registered nurses (RNs), little is known about functional consequences of MSDs in nurses.*
Methods *Data on neck, shoulder, and back MSD problems were analyzed in 1,163 working nurses (response rate = 74%). Cases had relevant symptoms lasting at least 1 week or occurring at least monthly in the past year, with at least moderate pain intensity, on average. MSD problems with a frequency, duration, or pain intensity below the level needed to meet the case definition were defined as MSD symptoms. Those who did not meet symptom or case criteria at any body site were defined as asymptomatic. Odds of consequences (e.g., saw a doctor/provider, missed work, reduced/modified work, non-work activities, or recreation, medication use, inadequate sleep) were estimated for cases versus those with symptoms.*
Results *We found 45.8, 35.1, and 47.0% of nurses had neck, shoulder, or back MSD problems (either at the case or symptom level), respectively, within the past year. Cases were far more likely to have seen a provider versus those with symptoms (adjusted odds ratio, aOR Neck: 4.33, 95% CI: 2.85–6.56; aOR Shoulder: 4.83, 95% CI: 3.00–7.77; aOR Back: 3.69, 95% CI: 2.47–5.49). Cases also were more likely to experience all other functional consequences.*
Conclusions *MSD consequences are substantial and suggest opportunities for intervention. Future research will examine the impact of work organization and physical demands on MSDs.* Am. J. Ind. Med. 41:170–178, 2002. *© 2002 Wiley-Liss, Inc.*

KEY WORDS: musculoskeletal disorders; nurses; functional consequences; occupational health; back; neck; shoulder injuries

INTRODUCTION

Musculoskeletal pain and musculoskeletal disorders (MSDs) have been shown to be highly prevalent among registered nurses working in a variety of settings. For work-related musculoskeletal disorders in private industry, registered nurses ranked sixth overall with 12,400 reported injuries requiring a median of 5 days lost from work [BLS, 1999]. Among all non-fatal occupational injuries, nursing and personal care facilities ranked second (incidence rate 13.8/100 workers) and hospitals ranked sixth (8.4/100 workers) [BLS, 2000].

Among nurses, low back pain/injury has been reported as the most frequently occurring MSD, with prevalences ranging from 30–60% [Estryn-Behar et al., 1990; Larese and Fiorito, 1994; Lagerström et al., 1995; Smedley et al., 1995]. Studies of upper extremity MSD in nurses have reported prevalences of shoulder problems in 43–53% of nurses, and of neck injuries between 31–48% [Lagerström et al., 1995; Ando et al., 2000]. The range in prevalence rates reported is largely due to the variety of definitions, thresholds, and durations used to classify MSD cases. The

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high prevalence of MSDs in nurses is thought to be due to the physical demands of the work as well as work organization factors. Nurses are often required to lift heavy loads, work in awkward postures, transfer patients, and operate hazardous equipment [Sosnowitz and Hriceniak, 1988; Allen, 1990; Collins and Owen, 1996; Brulin et al., 1998; Marras et al., 1999]. In addition, changes in health care have led to lower staffing rates for nurses and higher patient loads, both of which have been shown to increase injury rates [Shogren and Calkins, 1997].

Various case definitions for musculoskeletal disorders are cited in the literature. Some rely on the subject's reported frequency, duration or intensity of pain [Baron et al., 1996; Knibbe and Friele 1996; Josephson et al., 1997] while others define cases as any report of pain in the specified time period [Larese and Fiorito, 1994]. Physical examination findings have also been included in the definition, however, many MSDs have no detectable physical findings.

Another category of indicators is changes in functioning that reflect the consequences of an MSD. Though MSDs have been documented as a significant problem among health care workers, little is known about the prevalence of functional consequences related to reported MSDs in nurses. Owen and Garg [1989] found that 20% of nurses who reported back pain made at least one job change to reduce the required amount of lifting and transferring of patients. Baron et al. [1996] suggested that research examining the relation between MSD pain and function in several domains would be useful in estimating the consequences of reported MSDs.

The purpose of the overall study was to examine the relationship between professional nursing work and MSDs. In this analysis, we examined musculoskeletal symptoms in the neck, shoulder, or back in relation to functional consequences (seeking care, missing work, modifying work and other activities, inadequate sleep, using medication). This relation was examined among nurses working in a variety of settings, in order to evaluate the validity of a two-threshold definition of MSDs. The lower threshold was defined as an "MSD symptom" occurring in the past year. The higher threshold was defined as an "MSD case" and included past year symptoms, but also required that the injury exceed a specified frequency, duration and intensity of occurrence, with at least moderate pain intensity, with additional criteria established by Bernard et al. [1994]. We hypothesized that nurses with MSD problems severe enough to be defined as MSD cases would be more likely to experience functional consequences than nurses with MSD symptoms.

METHODS AND ANALYSIS

Sample and Data Collection

The sample was obtained from Illinois and New York. These states were selected for having ethnic diversity in their registered nurse workforce and for having different rates of managed care penetration at the time of sampling-(New York: higher than average; Illinois: lower than average). In each state, a list of 1,000 nurses was randomly selected from the list of actively licensed registered nurses residing in that state for a total of 2,000 nurses. Of the sample, 67 were defined as ineligible (incorrect mailing information, e.g., not a valid location, deceased respondents), leaving 1,933 eligible to participate. A total of 1,428 of the eligible participants or 74% responded to the survey. Of the 1,428 respondents, this analysis focused on the 1,163 respondents who were working in nursing in the past year and were in their current job for at least 1 year.

The design of the mailing procedures and contents was based on the methods of Dillman [1991] and the prediction model of Heberlein and Baumgartner [1978] for the final survey response rate. Data were collected via anonymous mailed survey, as the revelation of sensitive job data on safety in the workplace could threaten employment. Surveys were mailed to participant homes from October 1999 through February 2000. The instrument was an 8-page questionnaire designed for optical scanning, and contained sections on neck, shoulder and back problems; pain medication use; physical activity; work characteristics, and health and well-being.

Participant contact was through six first-class mailings. The first mailing was an introductory letter; the second contact contained the questionnaire with $1.00 and a mechanical pencil as incentives. The third contact was a thank you/reminder post card, followed by another copy of the questionnaire, and then by another thank you/reminder post card. The sixth and final contact used certified mailing to deliver a third copy of the questionnaire. Institutional Review Board (IRB) approval was obtained and a consent waiver form was issued secondary to the survey format and anonymity of participants.

As the survey was completely anonymous, there was an opportunity to be deleted from further mailings by returning a postcard indicating participation status to the study office. Completed surveys were returned to another, separate location. Once data collection was complete, the surveys were scanned electronically into a database. Data were then cleaned using logic, range, and consistency checks. The original completed questionnaires were also reviewed by hand for stray marks.

Variable Definitions

Musculoskeletal problems were ascertained by inquiring about symptoms in the neck, shoulder and/or back including pain, numbness, tingling, aching, stiffness, or burning in both their lifetime and in the past year. The questions used to measure pain/disorder were adapted from the Nordic questionnaire of musculoskeletal symptoms

[Kuorinka et al., 1987], and included a picture of the body region affected (neck, shoulder, back).

Frequency, duration, and intensity of the symptoms were measured. Frequency was on a 5-pt scale ranging from "almost never" (2 × a year) to "almost always" (daily); duration on a 7-pt scale ranging from usually lasts "less than 1 hr" to "more than 3 months"; and pain intensity (on average) on a 5-pt scale ranging from "none" to "worst pain ever".

The following definition of a musculoskeletal disorder case was used. The definition was developed by a team of medical and ergonomic experts and tested in subsequent NIOSH research. An "MSD case" was defined as a report of a relevant symptom with a duration of at least 1 week, or occurring at least monthly in the past year; with a pain intensity of at least a 3 (moderate) on a 5-pt pain scale [Bernard et al., 1994]. In addition to meeting these criteria, respondents had to have worked in their current nursing job for at least 1 year. Nurses sustaining a non-work related injury or accident up to 3 months prior to the onset of musculoskeletal symptoms were excluded. Figure 1 contains the decision tree utilized for participant inclusion. Respondents who acknowledged that in the past year they had experienced pain, aching, stiffness, burning, numbness or tingling in the body part specified, had worked in their current nursing job for 1 year or more, but did not meet the full definition, were classified as having "MSD symptoms." Respondents who experienced none of the above symptoms for a particular body site were instructed to skip to the next body site section. With this exception, those with no relevant symptoms (i.e., asymptomatic) completed the entire questionnaire.

The functional consequences addressed domains similar to those used by Lagerström et al. [1995]. Respondents were asked whether "in the past year has this problem resulted in your..." doing the following: seeing a physician or other health care provider, missing work, reducing or modifying work activities, reducing non-work activities (such as climbing stairs or housework), or reducing recreation (such as exercising, jogging). Any occurrence of these consequences during the past year was considered as positive for the consequence; there was no direction to select those associated with a particular MSD episode. For each body site, a separate set of these questions were asked so that the functional consequences could be attributed to the particular problem, i.e., neck, shoulder, or back.

Other variables were also examined. Medication use [non-steroidal anti-inflammatory (NSAIDS), steroids, narcotic analgesics, and muscle relaxants] for neck, shoulder and/or back pain/disorders was also assessed. Nurses were

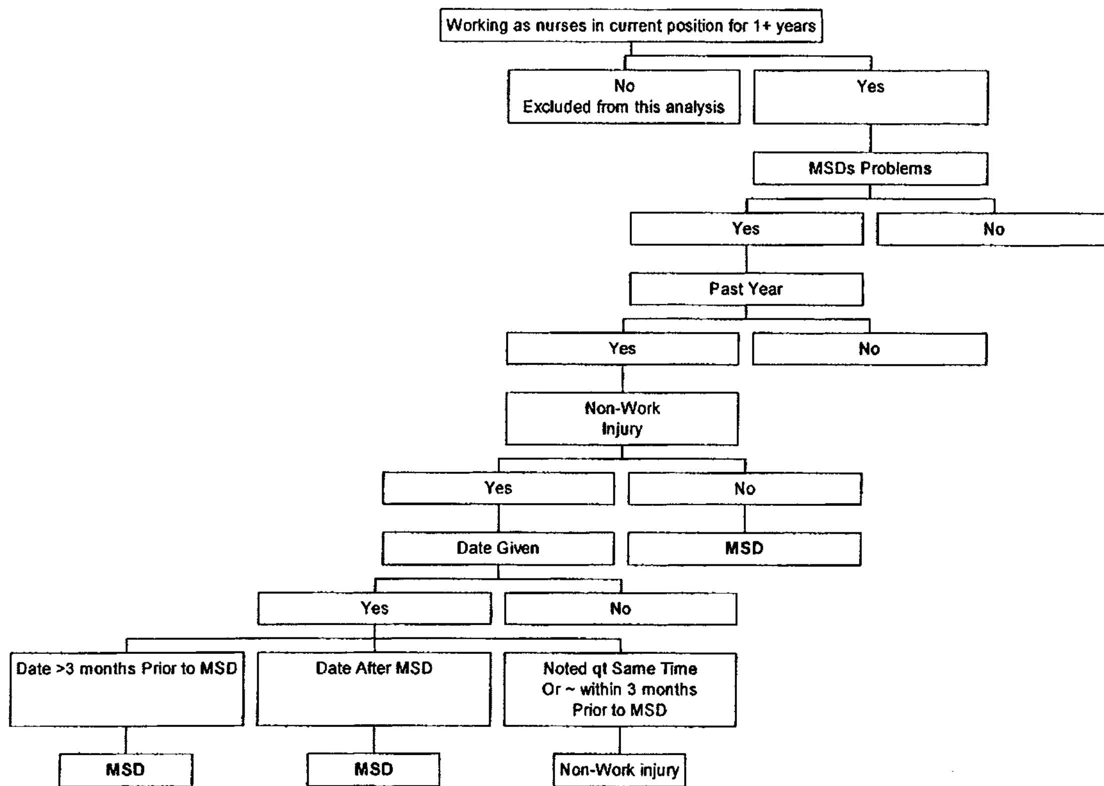

FIGURE 1. Decision tree for MSD in nurses.

also asked how many sick days they used in the past year for any reason. The sick days were collapsed into two categories: 0–2 and 3 days or more. Inadequate sleep was measured by asking how often respondents got less sleep than they thought they should. Those answering 5–7 days/week were defined as having inadequate sleep.

Data Analysis

Descriptive analysis of the data was conducted using cross-tabulations for MSD cases and MSD symptoms by body site, with the unit of analysis defined as the body site. Thus it was possible for respondents to report a problem at more than one body site. Following this, the proportion of nurses with neck, shoulder, and back problems reporting functional consequences was estimated. Finally, the odds of functional consequences due to a neck, shoulder, or back problem (saw a doctor or other provider, missed work, reduced/modified work, reduced/modified non-work, reduced recreation) were estimated for MSD cases, using MSD symptoms as the reference group, with and without adjustment for age. The purpose of these analyses was to indicate whether the MSD case group reported a higher likelihood of functional consequences compared to the MSD symptom group using logistic regression. This was used to test the validity of the MSD case definition, to see if it truly identified a subgroup with higher morbidity relative to the symptom group. As odds ratios for age-adjusted models were not significantly different from crude odds, we have just presented age-adjusted estimates.

Data on inadequate sleep and sick days for any reason were collected from *all* respondents, so that the initial reference group for these variables was those respondents who did not meet the criteria for MSD symptoms or cases *for the particular body site* (data not shown). However, because a sizable proportion of respondents met MSD (symptoms or cases) criteria for more than one body site, this may have led to misclassification bias, diluting the odds of a particular predictor variable. To address this issue, we conducted additional analyses using those who did not meet the criteria for MSD cases or symptoms at *any of the three body sites* as the reference group (i.e., asymptomatic). The results presented on sleep and sick days for any reason are those using the completely asymptomatic group as the reference group as outlined by Fredriksson et al. [2000]. This led to the deletion of between 300–400 subjects from the reference group, depending on the body site.

TABLE I. Description of the Sample of Nurses With 1+ Years in Current Job, 1999–2000 (n = 1163)*

Attribute	Total sample %
Gender (% female)	93.7
Race	
White	83.2
Black or African American	5.8
American Indian or Alaskan Native	0.2
Asian or Pacific Islander	8.1
Other	2.7
Marital status	
Married	71.0
Never married, living alone	13.0
Divorced, separated	12.4
Widowed	3.6
Educational attainment	
Diploma	19.5
Associates degree	29.8
Bachelors degree	35.9
Masters degree	13.1
Doctoral degree	0.7
Current nursing position—primary job	
Staff nurse	67.5
Manager or administrator	19.4
Advanced practice role[a]	10.8
Other	2.3
Type of workplace—primary job	
Hospital	57.5
Nursing home/long term care facility	8.6
Ambulatory clinic/ office/ HMO	12.5
Home health agency	6.6
Other school/government or community agency	10.2
Private business	2.6
Other	1.9

*Percents may not add up to 100 due to rounding.
[a]Nurse practitioners, clinical nurse specialists, nurse midwives, etc.

RESULTS

This sub-sample was largely female (94%) with 17% from an ethnic minority population. Over two-thirds were currently married (71%), with a mean age of 45 years (Table I). Half of the nurses had at least a 4-year college degree, two-thirds were employed as staff nurses in their primary job, and more than half (57.5%) worked in a hospital setting.

Proportion of Cases by Severity

Overall, 72.5% of the sample reported some level of MSD problem (symptom or case) in at least one site. By body site, 45.8% of the sample reported a neck problem, 35.1% reported a shoulder problem, and 47.0% a back problem within the past year. There was considerable overlap

across body sites, with 15.8% of respondents having either MSD symptoms or meeting the MSD case definition simultaneously for the neck, shoulder, and back. Of those with problems at more than one body site, 25.1% reported having a neck and shoulder problem (“MSD case” or “MSD symptom”), 27.2% reported having back and neck problems, and 20.7% had a shoulder and back problem. When the prevalence of MSD cases was examined for each body site, back MSD cases (31.8%) were more prevalent than neck (24.1%) or shoulder MSD cases (22.2%).

The distribution of severity also varied by body site. Among those reporting back problems, over half (56.7%) were MSD cases. Nurses reporting shoulder problems were split nearly equally into MSD cases versus MSD symptoms (49.1% vs. 50.9%, respectively), whereas for neck problems, more nurses had MSD symptoms (55.3%) than were MSD cases (44.7%).

Functional Consequences of Neck, Shoulder, and Back Problems

All functional consequences were reported in higher proportions among those with MSD cases compared to those with MSD symptoms (Table II). Almost half of all MSD cases saw a provider for their problem. Those with shoulder and back problems were more likely to report missing work than those with neck problems, though neck MSD cases had a far greater proportion missing work versus those with neck MSD symptoms (15.7% vs. 2.8%, respectively).

When adjusted for age and compared to respondents with MSD symptoms, MSD cases were three to five times as likely to have seen a physician or other health care provider for their problem (adjusted odds ratio, aOR Neck: 4.33, 95% CI: 2.85–6.56; aOR Shoulder: 4.83, 95% CI: 3.00–7.77; aOR Back: 3.69, 95% CI: 2.47–5.49) (Table III). Nurses with neck MSD cases were seven times more likely to report missing work for a neck problem, compared to nurses with neck MSD symptoms (aOR = 7.12, 95%CI: 3.20–15.82). Nurses with back MSD cases also had increased odds of missing work compared to those with back symptoms (aOR 2.68, 95% CI 1.66–4.33). For shoulder problems, missing work did not differ significantly between nurses with MSD cases versus MSD symptoms. For all body sites, nurses with an MSD case were significantly more likely to modify their work, to reduce non-work activities and to reduce recreation, compared to nurses with MSD symptoms.

Medication use by nurses followed a consistent pattern for neck, shoulder, and back MSD symptoms and MSD cases. For steroids, narcotic analgesics and muscle-relaxants, at each body site, there was a significant increase in the proportion of nurses that used medications to treat MSD cases versus for those with MSD symptoms. Narcotic analgesics and muscle relaxants were used by MSD cases at rates from two to three times the rates for the MSD symptom group for each body site (Table IV), as were steroids for shoulder and back pain. The odds of NSAIDS use differed only for back problems. Use rates for the overall sample of each medication was 71% for NSAIDS, 5% for steroids, 6% for narcotic analgesics, and 15% for muscle relaxants.

For inadequate sleep, there was a dose effect on the proportion of nurses reporting this consequence 5–7 days in the past week, such that more MSD cases reported this consequence than did those with MSD symptoms, and more of those with MSD symptoms reported inadequate sleep than those who were asymptomatic (Table II). Both MSD cases and symptoms had a significantly higher likelihood (aORs ranging from 2–3) of inadequate sleep when compared to asymptomatic nurses for all body sites (Table V).

Within the overall sample, only 10% of nurses used a week or more of sick days for any reason, with 5.2% of nurses using 7–13 sick days, and 4.3% of nurses using 14+ sick days in the past year. Neck and back MSD cases had significantly higher odds of using sick days for any reason compared to asymptomatic nurses (neck aOR = 1.43, 95% CI:1.00–2.04; back aOR = 1.59, 95% CI: 1.14–2.22) (Table VI).

DISCUSSION

This study sought to provide evidence for the validity of musculoskeletal disorder case definitions within a nursing population using duration, frequency, and intensity of pain criteria as postulated by Bernard et al. [1994]. This was done by examining the likelihood of reporting functional consequences such as missing work or seeing health care providers in relation to the presence of MSD symptoms compared to nurses meeting the MSD case definition. Based on this analysis, significant differences were found in the proportion of nurses reporting functional consequences for symptoms versus cases. Nurses with pain/disorder meeting the MSD case definition were far more likely to report functional consequences than nurses with problems defined as MSD symptoms. This suggests that within the nursing profession, the case definition used by Bernard and others adequately captures MSDs and the associated functional consequences among nurses. This study also suggests that survey data can be used as a valid estimate of the adverse outcomes of MSD, given sufficient accompanying information.

For each body site, nurses with problems that met the MSD case definition were significantly more likely to report seeing a doctor or other health care provider, modifying job duties, reducing non-work activity, and reducing recreation, when compared to those with MSD symptoms. This would be as expected if the MSD case definition truly captures those with more severe MSD problems. For missing work, neck and back MSD cases were associated with significantly

TABLE II. Functional Consequences of MSD Among Nurses With MSD Symptoms, MSD Cases and Asymptomatic Nurses* With 1 + years in Current Nursing Job, 1999–2000

	Body site					
	Neck		Shoulder		Back	
	Symptom N = 295	Case N = 238	Symptom N = 208	Case N = 200	Symptom N = 237	Case N = 310
Functional consequences (%)						
Saw a doctor or other provider	15.8	44.3	16.7	50.8	20.1	48.1
Missed work	2.8	15.7	34.8	45.7	12.1	26.3
Reduced or modified work activities	14.9	30.8	22.2	38.7	22.4	46.8
Reduced non-work activities (e.g., climbing stairs, housework)	19.5	46.0	26.3	56.5	36.2	62.3
Reduced recreation (e.g., exercising, jogging)	27.4	49.2	37.1	55.3	44.4	69.8
Use of medications for MSD condition						
NSAID	90.9	92.3	90.6	92.9	87.7	92.9
Muscle relaxants	14.1	31.9	18.6	30.9	14.8	26.5
Narcotic analgesic	8.0	14.6	7.4	16.9	6.0	16.5
Steroids	5.2	9.6	6.8	14.3	3.3	10.4

		Neck		Shoulder		Back	
	Asymptomatic	Symptom	Case	Symptom	Case	Symptom	Case
5–7 days per week of inadequate sleep*	8.7	16.5	22.1	16.8	20.8	17.3	18.5
3 or more sick days for any reason*	32.2	38.2	41.6	45.8	39.3	34.2	44.4

*Inadequate sleep and sick days for any reason calculated for the whole sample, therefore proportions are available on asymptomatic nurses (N = 320); other consequences measured only among nurses with neck, shoulder or back MSD problems.

TABLE III. Age-Adjusted Odds of Functional Consequences of MSD Cases Compared to MSD Symptoms by Body Site, for Nurses Working 1 + years in Current Job, 1999–2000

		Saw doctor or other provider		Missed work		Reduced or modified work activities		Reduced or modified non-work activities		Reduced recreation	
Body site	MSD definition	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Neck	MSD symptom	1.00		1.00		1.00		1.00		1.00	
	MSD case	4.33	2.85–6.56	7.12	3.20–15.82	2.52	1.63–3.90	3.51	2.36–5.22	2.61	1.79–3.79
Shoulder	MSD symptom	1.00		1.00		1.00		1.00		1.00	
	MSD case	4.83	3.00–7.77	1.40	0.69–2.83	2.20	1.39–3.46	4.02	2.59–6.23	2.21	1.46–3.36
Back	MSD symptom	1.00		1.00		1.00		1.00		1.00	
	MSD case	3.69	2.47–5.49	2.68	1.66–4.33	3.11	2.11–4.59	2.80	1.95–4.02	2.89	2.01–4.15

higher likelihood of missing work due to a neck or back problem, respectively, when compared to those with symptoms. This compares with the results on sick days for any reason, which found neck and back cases more likely to miss 3 + days/year.

The significantly increased likelihood of inadequate sleep for nurses with an MSD case or symptom was quite striking, as there are many possible reasons other than MSDs that might affect sleep adequacy. This indicates another consequence of MSDs that deserves further attention, as inadequate sleep has been linked with quality of job performance, psychological well-being, and quality of life [Sawyer et al., 1999; Poissonnet and Veron, 2000]. Earlier work examining the physical demands of nursing found that as physical demands on the job increased for nurses, the likelihood of inadequate sleep was also significantly increased [Trinkoff et al., 2001].

The degree of overlap of nurses meeting the MSD case and/or symptom definition at more than one body site was also an important finding and will be explored further in future analyses. Only 27.5% of the nurses were completely asymptomatic, having no symptoms in the neck, shoulder, or back. This low proportion of asymptomatics could be due to response bias, as perhaps those with problems were more likely to respond. As the response rate was 74%, if the non-respondents were also completely asymptomatic, there would still be relatively high prevalences of these problems, so it is likely not a sufficient explanation for this finding.

Much of the data on MSD prevalence comes from self-reported surveys of pain and other symptoms. Methodologic studies of self-reported MSDs suggest that such data are valid but may underestimate the prevalence of less serious MSD symptoms [Ekberg et al., 1995]. Similarly, those with symptoms requiring no medical care were more likely to have recall inconsistencies [Kuorinka et al., 1987]. The cross-sectional design of the survey prevents us from determining fully the temporal order of relationships, a necessary criterion for causal inference. Nonetheless, as consequences were measured in relation to neck, shoulder, or back problems, it is likely that the problems preceded the functional consequences reported.

Findings suggest that both definitions are useful, as the MSD symptom definition may indicate early distinctions

TABLE IV. Age-Adjusted Odds of Medication Use in MSD Cases Compared to MSD Symptoms by Body Site, for Nurses Working 1 + Years in Current Job, 1999–2000

		Narcotics		NSAIDS		Muscle relaxants		Steroids	
Body site	MSD definition	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Neck	MSD symptom	1.00		1.00		1.00		1.00	
	MSD case	2.09	1.14–3.82	1.18	0.61–2.30	2.94	1.89–4.57	1.90	0.94–3.85
Shoulder	MSD symptom	1.00		1.00		1.00		1.00	
	MSD case	2.76	1.37–5.56	1.28	0.58–2.83	2.08	1.28–3.38	2.31	1.13–4.71
Back	MSD symptom	1.00		1.00		1.00		1.00	
	MSD case	3.14	1.65–5.99	1.89	1.02–3.51	2.12	1.36–3.32	3.37	1.44–7.88

TABLE V. Age-Adjusted Odds and Prevalence of Inadequate Sleep in Nurses With MSD Cases or MSD Symptoms Compared to Asymptomatic Nurses by Body Site, Working 1+ Years in Current Job, 1999–2000

	OR (95% CI)		
Body site	**Asymptomatic**	**MSD symptom**	**MSD case**
Neck	1.00	2.09 (1.26–3.47)	3.15 (1.90–5.25)
Shoulder	1.00	2.23 (1.30–3.84)	3.33 (1.93–5.73)
Back	1.00	2.12 (1.25–3.60)	2.60 (1.58–4.26)

between healthy individuals and those who go on to develop an MSD case. Once identified, factors already associated with symptoms may lead to preventive interventions designed to prevent escalation of MSD symptoms into MSD cases. The odds for inadequate sleep for those with MSD symptoms between MSD cases and asymptomatic individuals suggest that there is a dose effect that may require intervention to prevent further aggravation of the problems. Future studies should focus on further refinement of risk factors and distinctions between individuals with MSD symptoms versus MSD cases, along with longitudinal follow-up to document the progression of symptoms to case levels of severity. From this, interventions to prevent escalation of symptoms into cases can be designed.

Back injuries, the most widely reported MSD in nurses, were reported at similar levels as in other studies of nurses. Neck and shoulder MSD cases were also common and MSD problems at each of the three body sites were associated with significant functional consequences. As data were collected across a comprehensive group of nursing jobs, the high prevalence of MSD problems is noteworthy. Future research will examine the impact of organization of work and physical demands to identify factors that might explain these findings.

TABLE VI. Age-Adjusted Odds of Using Sick Days for Any Reason, in Nurses With MSD Cases or MSD Symptoms Compared to Asymptomatic Nurses by Body Site, Working 1+ Years in Current Job, 1999–2000

	OR (95% CI)		
Body site	**Asymptomatic**	**MSD symptom**	**MSD case**
Neck	1.00	1.24 (0.88–1.74)	1.43 (1.00–2.04)
Shoulder	1.00	1.72 (1.19–2.49)	1.34 (0.92–1.97)
Back	1.00	1.04 (0.72–1.50)	1.59 (1.14–2.22)

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