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Musculoskeletal Pain and Psychological Distress in Hospital Patient Care Workers

Silje Endresen Reme, PhD, PsyD[1,2,*], **Jack T. Dennerlein, PhD**[1,4], **Dean Hashimoto, MD**[1,5], and **Glorian Sorensen, PhD, MPH**[3,1]

[1]Harvard School of Public Health, Boston MA

[2]Liberty Mutual Research Institute for Safety, MA

[3]Dana Farber Cancer Institute, Boston MA

[4]Brigham and Women's Hospital, Boston MA

[5]Partners HealthCare, Inc., Boston MA

Abstract

Purpose—The aim of the study was to assess the association of psychological distress and musculoskeletal pain, how it is related to pain interference with work and multiple pain areas, and potential differences between the different pain areas in hospital patient care workers.

Methods—Data were collected from a cross-sectional survey of patient care workers (n=1572) from two large hospitals.

Results—Patient care workers with musculoskeletal pain reported significantly more psychological distress than those without pain. Psychological distress was significantly related to pain interference with work, even after adjusting for pain and demographics (OR = 1.05; CI = 1.01–1.09). The association was strongest for those with both upper- and lower body pain (OR = 1.12; CI = 1.06–1.18). Psychological distress was also independently associated with multiple pain areas.

Conclusions—Psychological distress was found to be higher in workers with musculoskeletal pain, and highest among workers with both upper and lower body pain. Distress was further significantly associated with pain interference with work as well as number of pain areas. The findings may be followed up with a longitudinal design to better determine the direction of the associations, and to investigate if psychological distress increases the risk of work disability and injuries.

Keywords

healthcare workers; nursing personnel; musculoskeletal disorders (MSDs); musculoskeletal pain; psychological distress; pain interference with work

INTRODUCTION

In the US alone, back and neck problems are the leading cause of work-related disability, costing more than $50 billion each year [1]. Workplace injuries related to musculoskeletal pain are a particular and persistent problem for nursing personnel as evidenced by the large

*Corresponding author: Silje Endresen Reme, Department of Environmental Health, 450 Brookline Avenue, Boston MA 02215; fax: 617.632.4858, tel: 617-582-7463, sreme@hsph.harvard.edu.

number of lost work time in this sector [2]. Still, workplace injuries only reflect parts of the problem since injury incidence rates are an incomplete measure of the extent of work-related back pain. There are several reasons for this, including restrictions on what constitutes an injury case, reluctance to file injury claim due to fear of employment repercussions, and health care worker conditioning to ignore back pain [3–6]. Symptom surveys examining participants own reports of back pain as well as *pain interference with work* may therefore be a better indication of the extent of this problem.

Musculoskeletal pain is commonly associated with psychological distress, particularly depression [7–9]. Different hypotheses have been suggested to explain the association between the two, including the following three; 1) psychological distress increases the risk of pain (antecedent hypothesis), 2) pain increases the risk of psychological distress (consequences hypothesis), and 3) a common mechanism influences the development of both chronic pain and psychological distress (common pathogenetic mechanism). A longitudinal study of low back pain (LBP) patients in primary care showed that LBP and psychological distress were associated both cross-sectionally and longitudinally, suggesting there might be multiple mechanisms linking pain and psychological distress [8]. Assuming no residual confounding, there seems to be support for all three hypotheses. Further, there seems to be an interesting difference between upper- and lower body pain conditions regarding psychological distress. For instance, LBP has been found to be associated with higher levels of psychological distress than shoulder pain [10], and the same differences have been found between LBP and neck pain, where persons with LBP are more likely to suffer from psychological distress and serious mental illness than persons with neck pain [9].

Co-morbid psychological distress in workers with musculoskeletal pain could have important implications from an injury and disability prevention perspective. Given that psychological distress has been found to be a powerful prognostic factor in recovery from musculoskeletal pain [11–15], it may need to be specifically targeted to prevent further disability-related to injuries involving pain. Knowledge about the associations between psychological distress, musculoskeletal pain, and interference with work could therefore help inform the design of future health promotion and disability prevention interventions aimed at both primary and secondary prevention.

The health care sector seems to be slightly different than other sectors when it comes to workers' health. In the US, patient care workers have one of the highest musculoskeletal injury and illness rates among all three-digit Standardized Industrial Classification codes [2], and besides an increased risk of musculoskeletal disorders, nursing personnel also have a higher risk of blood-borne infections and occupational allergies [16]. The increased risk of work-related injuries in patient care workers has been related to the nature of their work, involving frequent exposure to biological, chemical, physical and psychosocial hazards [17]. Previous studies have mostly been focused around the physical risk factors for musculoskeletal injuries, but recent studies indicate that psychosocial factors may be even more important risk factors of pain and disability in patient care workers [18–20].

Despite the many studies associating pain with distress, no studies have looked specifically at the co-occurrence of musculoskeletal pain and psychological distress in a health care setting, and whether the psychological distress is independently related to interference with work or number of pain areas. The aims of this study were to use data from a survey of health care workers to assess the association of psychological distress and musculoskeletal pain, how it is related to pain interference with work and multiple pain areas, and potential differences between the different pain areas. We hypothesized that psychological distress

would be independently associated with pain interference with work, and more so for workers with lower body pain compared to upper body pain.

METHODS

Study design

The "Be Well Work Well Study" is one of three studies conducted by the Harvard School of Public Health Center for Work, Health and Wellbeing. Data presented in the current paper were derived from a cross-sectional survey of patient care workers conducted in two large teaching hospitals in the Boston area in late 2009. The primary aims of the survey were to identify the relationships among worksite policies, programs and practices, and worker health and economic status. The survey was designed to evaluate associations of MSDs and worker health behaviors to physical and psychosocial exposures on the job, as well as preventive measures in the work place. The study was approved by the applicable Institutional Review Board for protection of human subjects.

Sample

The survey included all workers employed between October 1, 2008 and September 30, 2009, who worked 20 hours per week or more or who were designated as at least half time in Patient Care Services and who had direct patient care responsibilities (including registered nurses, licensed practical nurses, and patient care assistants/nursing assistants). Eligible employees worked in patient care units under the direction of a nurse director. Patient care workers assigned to the "float" unit were eligible to participate in the survey; allied health professionals (e.g., physical therapy, occupational therapy), support staff assigned to environmental services, and any staff on physical medicine units were excluded. Ineligible participants were workers on an extended absence greater than 12 weeks, per diem staff, and traveling or contract nurses.

Data collection

A random sample of 2000 eligible workers was invited via email to participate in the online survey. Two survey reminders were sent out, and after four weeks a paper version of the survey was mailed to workers who had not yet completed the online survey. A second paper survey and a third email reminder were sent to all non-respondents after another two weeks; one month later a final email reminder was sent to all non-respondents. A total of 1572 workers initiated completion of the online survey. Of those, 1399 (89%) completed at least 50% of the survey items and met our definition of survey completion. An additional 173 workers returned a completed mailed version of the survey. The total number of completed surveys was 1572 for a response rate of 79%.

Primary outcomes

Psychological distress—Psychological distress was measured over a 30-day recall period with the Kessler 6 (K6) scale [21–23]. The scale queries respondents in 6 domains: "During the past 30 days, how much of the time did you feel the following ways: a) So sad that nothing could cheer you up? b) Nervous? c) Restless or fidgety? d) Hopeless? e) That everything was an effort? and f) Worthless?" Possible responses are none of the time, some of the time, a little of the time, most of the time and all of the time. Item scores are summed for a total score of 0–24. According to scoring criteria established by Kessler et al, persons with a score ≥13 are considered likely to have serious mental illness. Clinically, serious mental illness is defined as any one 12-month Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition disorder from the Structured Clinical Interview. The K6 has

further been found to outperform more commonly used measures in detecting depression and anxiety in the general population [22].

Musculoskeletal pain—Musculoskeletal pain was measured using an adaptation of the Nordic question, "During the past 3 months, have you had pain or aching in any of the areas shown on the diagram?" [24]. Using a diagram as a reference, respondents were asked to identify areas in which they experienced pain: lower back, shoulder, wrist or forearm, knee, neck, ankle or feet, and none of the above. The responses were combined to define subgroups of pain locations: Lower body pain included LBP (with or without leg pain), while upper body pain included shoulder, wrist/forearm and/or neck pain. A third group included respondents with pain in both upper and lower body, and the last group included workers with no pain.

Secondary outcomes

Pain interference with work—Pain interference with work was measured by asking the participant the following question: "In general, how much did this pain (in any body area) interfere with your normal work? (Include both work outside the home and housework.)" The responses were scored on a likert scale ranging from "not at all" to "extremely." The variable was dichotomized as not at all and a little bit vs. moderately, quite a bit, and extremely.

Other variables assumed to be potential covariates included gender, marital status, race/ethnicity, education, age, BMI, and pain intensity.

Multiple pain areas—Number of pain areas was measured by counting the number of pain locations indicated by the participants on the diagram (as previously described). Responses included 6 areas of pain: Lower back, shoulder, wrist or forearm, knee, neck, ankle or feet, or none of the above. The variable was dichotomized between those with only one or two pain areas/no pain, and those with more than 2 pain areas.

Statistical methods

Descriptive statistics, including frequency distributions were used to assess the prevalence of musculoskeletal pain and psychological distress. To assess potential differences between upper and lower body pain we used cross classification and the Chi-square test of homogeneity or the t-test on the difference of means. Multiple logistic regression analysis was used to investigate the association between psychological distress, and the secondary outcomes (pain interference with work and multiple pain areas), controlling for potential confounders (pain intensity, disability, demographic variables). Differences in psychological distress among respondents with pain in different locations were assessed through the analysis of variance.

RESULTS

Characteristics of the sample

The sample of 1572 patient care workers consisted of 91% women with an average age of 41 years. Most were of non-Hispanic White ethnicity (79%) (see table 1 for more characteristics).

When asked about pain in the last 3 months, 64.5% reported lower body pain, while 45.7% reported upper body pain. 26% (n=414) reported no pain the last 3 months (table 2). A comparison between those with and without reported pain showed that those with pain had a

significantly higher level of psychological distress (*M*=2.76, *SD*=3.42) than those without pain (*M*=1.90, *SD*=2.94; *p*<.01).

Pain intensity, number of pain areas, psychological distress and higher age were independently associated with pain interference with work. As hypothesized, psychological distress seems to be an important factor for pain interference with work, even after adjusting for several pain variables and demographics (Table 3).

When the same multiple regression model was run with multiple pain areas (more than 2 pain areas) as an outcome, psychological distress was also found to be independently associated with multiple pain areas, even when adjusting for pain intensity, gender, age and BMI (Table 4).

The difference in psychological distress between upper and lower body pain was not statistically significant. However, those with both upper and lower body pain had significantly more psychological distress than those with only upper or only lower body pain, or those with no pain (Table 5).

The association between psychological distress and pain interference with work was further investigated in stratified models for participants with only upper body pain, only lower body pain, or both upper and lower body pain. Psychological distress was associated with pain interference with work in those with only lower body pain (n=419, OR 1.08, CI=1.01–1.15, *p*=0.016) and those with both upper and lower body pain (n=541, OR 1.12, CI=1.06–1.18, *p*<0.01), but not in those with only upper body pain (n=135, OR 1.07, CI=0.94–1.20), *p*=0.31). The smaller number of patients in the last model could account for the lack of significance in this model.

Finally, to explore the possibility of a smaller subgroup with more severe disability, psychological distress was analyzed separately for each response alternative in the pain interference with work variable. Those responding “not at all” had the lowest report of psychological distress (*M* =1.58), those responding “a little bit” had higher (*M*=2.50), those responding “moderately” even higher (*M*=3.25), and those responding “quite a bit”, highest reports of psychological distress (*M*=3.99). Somewhat surprisingly, those responding “extremely” had lower reports of psychological distress than the two previous categories (*M*=2.67). It thus appears that the workers in the next highest category, reporting “quite a bit of pain interference with work”, differentiate from the rest as a more severely disabled and distressed group. This group further reported more pain areas (*M*=2.7) compared to the most extreme group (*M*=2.3), and had a higher percentage of workers with both upper and lower body pain (61%) compared to the most extreme group (45%), as well as the total average (37%).

DISCUSSION

In this study, we found that patient care workers who reported any musculoskeletal pain during the last 3 months, also showed significantly more psychological distress compared with those who did not report any pain. Psychological distress was significantly associated with pain interference with work, even after adjusting for pain and demographics. The association was stronger for those with lower body pain or both upper- and lower body pain, with the strongest association presenting in the group with pain in both places. The workers with both upper and lower body pain also reported significantly more psychological distress than other workers. Finally, psychological distress was also independently associated with multiple pain areas. Thus, psychological distress seems to be more prevalent in workers with musculoskeletal pain, and more so for workers with both upper and lower body pain. The

distress further seems to be independently associated with pain interference with work as well as multiple pain areas.

When psychological distress was analyzed separately for each response alternative of the "pain interference with work" variable, one response category appeared to identify a particularly disabled and distressed group. Generally, the responses showed a linear relationship between higher interference with work and higher levels of psychological distress, except for the most extreme category, which somewhat surprisingly showed lower levels of psychological distress compared to the two previous categories. The most work-disabled and distressed group was therefore those in the next highest category, reporting that the pain interfered "quite a bit" with their ability to work. When comparing this group to the group in the highest category (extreme interference) the former was found to report higher pain comorbidity in terms of more pain areas. This is in line with the overall results of the study and could potentially account for these findings.

Few, if any, previous studies have looked specifically at psychological distress in relation to musculoskeletal pain in hospital patient care workers, but our findings do compare with previous findings of psychosocial factors and musculoskeletal pain in health care workers. Expectations about pain duration and fear-avoidance beliefs were both important psychosocial factors associated with long duration pain in a study of community health care workers [20], and a stressful psychosocial work environment was found to be significantly associated with both upper body injuries [25] and back or neck-pain-related disability in nursing staff [18]. In hospital workers in general, work-related musculoskeletal pain is more strongly influenced by specific psychosocial and physical job-related exposures than by broad socioeconomic factors such as education and income [26]. Among nurses' aides, not only mechanical exposure, but also organizational, psychological and social work factors increase the risk of low back symptoms [19]. The study by Simon et al [18] is of particular interest as it compares a large number of nursing staff from seven different countries. The findings show a pronounced relationship between psychosocial factors and back or neck-pain-related disability, and the association is much higher for psychosocial than for physical factors [18]. This leaves little doubt that psychosocial factors are important for musculoskeletal pain and disability. Given the close relationship, both conceptually and empirically, between psychosocial work stress and psychological distress [27], our findings seem to be in concordance with these previous studies.

Possible implications of our findings could involve targeted interventions for workers with persistent pain and concurrent psychological distress. The elevated level of psychological distress in some of the workers could be an indication of poor pain management. A number of different studies over the last 20–30 years have demonstrated that behavioral and psychosocial protocols are beneficial for patients with persistent pain [28], including management of LBP [29–31], arthritis pain [32, 33], cancer pain [34, 35], tension and migraine headache [36], and mixed chronic pain syndromes [37]. Offering some kind of behavioral or psychosocial intervention to help patient care workers cope with the pain, could therefore help reduce psychological distress and possibly also prevent future disability. Even if the degree of psychological distress was far from any clinical diagnostic levels in most of the workers, it could still represent a risk factor for future disability as seen in other studies from working populations [15]. The workers with both upper and lower body pain showed a particularly high level of psychological distress that influenced their ability to work. It is possible that the wide specter of hazards these workers are exposed to make them particularly sensitive for developing vicious circles of pain and disability. Further research is needed to look more in to the specific risks of the workers in this sector. Given the wide specter of hazards we know them to be exposed to, it seems important that

the psychological dimension as well as the physical and environmental dimensions also be considered in the design and refinement of future workplace interventions.

The study has some limitations that need to be considered. As for the elevated levels of psychological distress, the magnitudes of the odds ratios we found to be statistically significant may not have corresponding clinical relevance. Still, we would argue that even small changes in the risk could have important public health implications at the population level [38], and even more so for such a costly and prevalent problem as musculoskeletal pain. The generalizability of the results could further be questioned as they are all based on data collected from two academic teaching hospitals in the greater Boston area, and self-report results are always vulnerable for recall and social-desirability bias. Still, the study has an important strength worth noting, which is the high response rate to the survey (79%). The findings rely on cross-sectional data, and as with any cross-sectional studies, it is not possible to draw any conclusions regarding causality or direction of associations. One direction for future research could therefore be to investigate these associations with longitudinal data to see whether psychological distress is a risk factor for work-related injuries in patient care workers, and if number of pain areas and location influence the potential risk in any way.

CONCLUSION

In a study of mostly White, female hospital patient care workers, psychological distress was higher in workers with musculoskeletal pain, and highest among workers with both upper and lower body pain. Distress further seemed to be significantly associated with pain interference with work as well as number of pain areas. These findings may be followed up with a longitudinal design to better determine the direction of the associations, and to investigate if psychological distress increases the risk of work disability and injuries.

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Table 1

Demographic Characteristics of Participants (N = 1572)

Variable	N	%
Gender:		
Male	143	9.1
Female	1369	87.1
Missing	60	3.8
Race:		
Hispanic	65	4.1
White	1185	75.4
Black	159	10.1
Mixed race/Other	89	5.7
(other/not reported)	74	4.7
Age		
21–30	358	23
31–45	528	34
46–73	592	38
(not reported)	94	6
BMI:		
BMI <25	698	44.4
BMI 25+	722	45.9
(not reported)	152	9.7
Marital status:		
Married or cohabitant	976	62.1
Single, divorced, widowed	509	32.4
(not reported)	87	5.5
Education:		
Less than Grade 12 or GED	8	0.5
Grade 12 or GED	70	4.5
1–3 years of college	360	22.9
4-year college degree	803	51.1
Attended graduate school	109	6.9
MS in Nursing	113	7.2
MS in a field other than Nursing	35	2.2
PhD or similar doctorate in Nursing	4	0.3
PhD or similar in a field other than Nursing	3	0.2

Table 2

Clinical Characteristics of Participants (N = 1572)

Variable	N	%
Pain last 3 months:		
Lower body pain	1011	64.5
Upper body pain	716	45.7
Pain interference with work		
Moderate, quite a bit, or extreme	516	33.1
A little or not at all	630	40.4
No injury	414	26.5
Psychological distress (at least some of the time):		
Sad	339	22.1
Nervous	801	52.6
Restless or fidgety	594	38.9
Hopeless	216	14.2
Everything an effort	517	34.0
Worthless	166	10.9
	Mean	*SD*
Psychological distress (0–24):	2.53	3.32
Low back pain intensity (1=none to 5=extreme):	1.73	0.88
Upper body pain intensity (1=none to 5=extreme):	1.52	0.80

Table 3

Univariate and multivariate associations (odds ratios), outcome: pain interference with work

	Univariate associations		Multivariate model	
Variables	**OR (95% CI)**	***p-value***	**OR (95% CI)**	***p-value***
Psychological distress	1.12 (1.08–1.16)	<0.001	1.05 (1.01–1.09)	0.014
Lower back pain intensity	2.80 (2.44–3.22)	<0.001	2.04 (1.72–2.41)	<0.001
Upper body pain intensity	1.99 (1.73–2.29)	<0.001	1.28 (1.07–1.53)	0.006
Gender	1.44 (0.97–2.12)	0.070	1.64 (1.00–2.70)	0.051
Age	1.01 (1.00–1.02)	0.072	1.01 (1.00–1.03)	0.019
BMI	1.04 (1.02–1.06)	0.001	1.02 (1.00–1.05)	0.074
Number of pain areas (1–6)	1.85 (1.70–2.02)	<0.001	1.46 (1.31–1.63)	<0.001

Table 4

Univariate and multivariate associations (odds ratios), outcome: multiple pain areas *

	Univariate associations		Multivariate model	
Variables	**OR (95% CI)**	***p-value***	**OR (95% CI)**	***p-value***
Psychological distress	1.12 (1.09–1.16)	<0.01	1.06 (1.02–1.1)	<0.01
Lower back pain intensity	2.49 (2.17–2.85)	<0.01	2.25 (1.91–2.64)	<0.01
Upper body pain intensity	2.75 (2.36–3.19)	<0.01	2.40 (2.02–2.85)	<0.01
Gender	1.10 (0.74–1.64)	0.635	1.00 (0.61–1.63)	0.994
Age	1.00 (0.99–1.01)	0.588	1.00 (0.99–1.01)	0.690
BMI	1.01 (0.99–1.03)	0.319	1.00 (0.98–1.03)	0.792

* More than 2 pain areas

Table 5

Difference in psychological distress between pain locations

	Psychological distress				
	N	**Mean**	**SD**	***F***	***p-value***
No pain	392	1.90	2.94	16.8	<0.001[a]
Upper body pain only	136	1.97	2.83		
Lower body pain only	421	2.31	3.21		
Both lower and upper pain	545	3.30	3.63		

[a]Tukeys Post Hoc test: Both>lower, upper, no muscle pain