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Occupational Factors Causing Pain Among Nurses in Mainland China

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Background: Pain is a common problem affecting the wellbeing of nurses. This study investigated physical pain of nurses and their pain self-management in mainland China.

Material/Methods: A total of 2458 full-time nurses working in 18 hospitals across mainland China were studied from May 2016 to July 2016, of which a total of 1269 nurses (51.63%) experienced pain during the duration of this study.

Results: Of the nurses reporting pain, most had general chronic pain (936 cases, 73.8%). Many nurses also had moderate to severe pain (904 cases, 71.2%). Another type of pain that was common was back and lower-limb pain (740 cases, 58.3%). Of the diagnosable symptoms, lumbar spondylosis was the most prominent, with 258 cases (33.1%). Nearly 50% of the nurses reported that their lives and sleep had been disrupted by pain, and 33.9% of the subjects are unsatisfied with their level of self-management of pain. Only 13.4% said that they would seek formal medical attention after feeling pain. Multivariate logistical analysis showed that factors such as the level of the hospital, years of experience, and shift schedule have a strong correlation with the incidence of pain among nurses.

Conclusions: The main cause of pain among nurses in mainland China is occupational factors, and the current status of this problem is not satisfactory.

MeSH Keywords: Nurse Clinicians • Occupational Diseases • Pain Clinics

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Background

Physical pain is a common problem affecting the wellbeing of nurses. A study by Geiger-Brown and Lipscomb [1] on the effects of pain on nurses' health reported that during a 12-month period, 45% to 76% of nurses had back pain, 28% to 60% had neck pain, 35% had shoulder pain, and 22% had knee pain. Additionally, 85% of nurses develop musculoskeletal symptoms. A cross-sectional study reported that 70% of nurses had musculoskeletal symptoms in the past year and 64% in the past month [2]. A national investigation reported that lower back pain ranked first among work-related health hazards for nurses in Taiwanese hospitals [3]. A recent meta-analysis illustrated that the prevalence of lower back pain in Chinese nurses was 65% to 79% [4].

Physical pain has not only a negative effect on the nurses' body and mind, but also a negative effect on the quality of care that nurses provide. This pain can cause nursing personnel to miss work and eventually lead them leave the profession [5], affecting the stability of the nursing profession as a whole. Therefore, we cannot ignore the pain of nurses. Currently, the focus in this field of study is on the causes of profession-related physical pain of nurses and its prevention. Comparatively few studies have explored this subject. Thus, the present study investigated and analyzed the status, cause, and management of physical pain in nurses in mainland China.

Material and Methods

Sample

From May to July of 2016, 18 hospitals were chosen from Chongqing, Changsha, Beijing, Urumqi, Harbin, Shenzhen, Yibin, Rizhao, Zhangjiakou, and Kunming, including 10 tertiary hospitals and 8 sub-tertiary level hospitals. Invitations to participate in the study were sent to all qualifying nurses and 2720 nurses gave consent to participate.

Qualifying Standard: 1) Full-time and certified nurse. 2) Fully understood the content of this survey and volunteered to participate.

Disqualifying Standard: 1) Intern nurses. 2) Trainee nurses.

Research plan

This 2-month cross-sectional study was approved by the Ethics Committee of Si Chuan University School of Medicine and it complied with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all nurses included in the study.

Research tools used

By consulting and referring to previous research data, the research team was able to produce an original, tailor-made survey plan titled: "Pain Among Nurses Survey"; the final draft was revised by 6 pain management experts and nursing specialists. This survey was then pretested on a small sample of 36 nurses chosen from 2 tertiary hospitals and 3 secondary hospitals locally, showing that the survey was clear, logical, and understandable.

The survey contains demographic data (age, gender, marital status, hospital level, department, experience, shift, and administrative duties), pain (rate of incidence, related symptoms, area affected, degree of pain experienced, impact on daily life and sleep), and self-management of pain (method of management and level of satisfaction with management), for a total of 3 categories and 18 items. The Visual Analogue Scale/Score (VAS) in the appendix of the survey was used as a method for evaluating pain intensity in this study.

Operation methodology

The "Pain Among Nurses Survey" was sent, along with a detailed set of instructions, to the subjects who agreed to participate in this study. During the final week of the research schedule, 120 second-year nursing students, all qualified after receiving standardized training, collected the survey data via phone interviews with the subjects.

Quality control

To prevent and remedy bias, every phone interview consisted of 2 interviewers and all input data to the analysis software required double entry.

Variables assignment of malaise symptoms

We set the various malaise symptoms as the dependent variable and the factors that showed correlation from the univariate analysis as independent variables. Next, we assigned the following variables with these values: 1) Hospital: Tertiary=1, Non-Tertiary=0. 2) Department: Surgery (operation room)=1, Internal Medicine=2, Comprehensive=3, ICU=4, Emergency=5, Outpatient=6. 3) Experience: 1 to 5 years=1, 6 to 10 years=2, Above 10 years=3. 4) Marital Status: Married=1, Single=0. 5) Age: Less 30=1, Over 30=0. 6) Shift: Nightshift=0, Other shifts=1. The above variables were used for the following logistic regression analysis.

Statistical analysis

Statistical analyses were performed using Predictive Analytics version 18.0 software (IBM Corp., Somers, NY, USA). Categorical

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Table 1. Demographic characteristics of participants.

Demographic characteristics	Sample (n=2458)	
Age (n,%)		
≤30 years (mean ±SD)	908	(36.9%)
>30 years (mean ±SD)	1550	(63.1%)
Gender (n,%)		
Female	2369	(96.4%)
Male	89	(3.6%)
Marriage		
Married	1405	(57.2%)
Single	1053	(42.8%)
Hospital grade		
Tertiary	2157	(87.8%)
None tertiary	301	(12.2%)
Department (n,%)		
Surgery	836	(34.0%)
Medicine	843	(34.3%)
General	302	(12.3%)
ICU	234	(9.5%)
Emergency	143	(5.8%)
Clinic	100	(4.1%)
Years of experience (n,%)		
1–5 years	1113	(45.3%)
6–10 years	718	(29.2%)
>10 years	627	(25.5%)
Nurse manager (n, %)	144	(5.9%)
Night shift nurse (n, %)	625	(25.4%)

variables were characterized by percentage and frequency, whereas continuous variables were characterized by mean ± standard deviation (SD). The associations between categorical variables and nurses' pain prevalence were analyzed using Pearson's χ^2 test. Single-factor analysis was carried out via Mann-Whitney U rank sum test and multiple-factor analysis was carried out via a logistic regression model. The test was bilateral, and a P value of less than 0.05 was considered statistically significant.

Results

Sample characteristics (sociological perspective)

A total of 2720 questionnaires were sent out, with a response rate of 92.68% (2521 questionnaires returned). Among the 2521 questionnaires returned, 2458 (90.37%) questionnaires were valid and could be used in the study. The samples were mainly obtained from tertiary hospitals (2157). The departments involved included surgical ward, internal medicine ward, ICU ward, emergency ward, general diagnostics, and other departments. Most of the respondents (1345) had 6 or more years of nursing experience and a total of 625 rotation staff were recorded (Table 1).

Table 2. Self-rated health, prevalence of pain, and pain-related diseases of nurses.

Variable	n (%)	
Self-rated health (n=2458)		
Poor	225	(9.2%)
General	1486	(60.5%)
Good	747	(30.4%)
Pain prevalence (n=2458)		
No	1189	(48.4%)
Yes	1269	(51.6%)
Pain related malaise (n=780)		
Lumbar spondylosis	258	(33.1%)
Dysmenorrhea	161	(20.6%)
Cervical disorder	148	(19.0%)
Headache	96	(12.3%)
Shoulder disorder	84	(10.8%)
Joint pain	70	(9.0%)
Stomach illness	55	(7.1%)
Lower limb varicosity	22	(2.8%)
Gallbladder disorders	16	(2.1%)
Toothache	7	(0.9%)
Ischialgia	5	(0.6%)

Pain malaise and self-management evaluation

A total of 1269 (51.6%) nurses reported having pain and 780 (31.7%) nurses had diagnosed ailments: 258 (33.1%) had lumbar spondylosis, 161 (20.6%) had dysmenorrhea, and 148 (19.0%) had cervical spine disease (Table 2). The pain symptoms reported were mainly moderate to severe chronic pain in the back and lower extremities, and nearly 50% of the nurses considered this pain to have affected their daily lives and sleep (Table 3). Physiotherapy was the first choice for treating musculoskeletal conditions such as lower back pain, and only 13.4% (170) of the nurses chose to seek other medical attention for pain relief. We found that 33.9% of the nurses were not satisfied with their level of self-management for pain (Table 4).

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Table 3. Characteristics of nurses' pain (n=1269).

Variable	n (%)	
Chronic pain	936	(73.8%)
VAS		
1-3	235	(18.5%)
4-6	519	(40.9%)
7-10	385	(30.3%)
None	130	(10.2%)
Pain location		
Back and lower limbs	740	(58.3%)
Shoulder, neck and upper limbs	476	(37.5%)
Chest and abdomen	313	(24.7%)
Head	229	(18.0%)
Maxillofacial	41	(3.2%)
Impact on daily life		
Mild	644	(50.7%)
Moderate	424	(33.4%)
Severe	159	(12.5%)
Impact on sleep		
Mild	709	(55.9%)
Moderate	326	(25.7%)
Severe	181	(14.3%)
None	53	(4.2%)

Table 4. Pain management of nurses (n=1269).

Characteristics		n (%)	
Pain management strategy	Physiotherapy	981	(77.3%)
	Endure	378	(29.8%)
	Take analgesics	199	(15.7%)
	Seek medical attention	170	(13.4%)
Satisfaction with pain management	Bad	307	(33.9%)
	Mixed	310	(34.2%)
	Good	289	(31.9%)

Pain prevalence factors by univariate analysis

The Mann-Whitney U rank sum test was used to assess 18 factors that may cause pain in nurses. The results showed a correlation between the nurses' pain symptoms and the hospital level, department, years of practice, frequency, marital status, and age ($P<0.01$). These 6 factors, along with 1 un-correlated factor (administrative duties [$P>0.05$]), are shown in Table 5.

Pain prevalence factors by multivariate analysis

The logistic regression analysis shows that hospital grade, experience, and shifts were significantly correlated with pain frequency ($P<0.01$) (Table 6).

Discussion

We found that 51.6% of the studied nurses showed symptoms of pain, which is much higher than in developed Western nations and is on par with that of nurses in African countries [6]. This means that physical pain is a common health concern for mainland Chinese nurses, and this problem has not been widely recognized or addressed.

Our results show that the main pain experienced by mainland Chinese nurses is moderate-to-severe chronic pain in the back and lower extremities, and this observation is consistent with previous studies. Branney and other studies have shown that chronic pain in the waist and back has the highest occurrence among nurses, and more than 56% of nurses regularly suffer from waist and lower back pain [7]. A Chinese study [8] has also shown that chronic pain in the waist and lower back of nurses has an incident rate of 55.6%. In addition, some studies have pointed out that the level of chronic back pain is in the mild-to-moderate range after 1 year has elapsed [9]. However, most of the subjects on this study found moderate-to-severe pain. Due to the short duration of this study, timely intervention may still be an option.

In addition, this survey discovered that nearly 38% of the nurses' pain was associated with a known diagnosis, of which lumbar spondylosis ranked first, followed by dysmenorrhea and cervical spine disease. This result is in line with previous survey data [10]. Furthermore, our study pointed out that nurses have a high incidence of lumbar spondylosis due to occupational factors, leading to the formation of chronic pain in the lumbar spine region [11]. A survey on dysmenorrhea among nurses in 2 southern hospitals in Taiwan showed that 70.7% had dysmenorrhea intermittently or continuously, suggesting that attention should be given to this biological problem in women during the study of pain among nurses [7].

Data also showed that nurses in mainland China have an inadequate level of pain self-management. Most nurses only undergo physiotherapy after pain is felt, rather than seeking other medical attention or taking medication. This is consistent with pain management strategies in many developing

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Table 5. Association between nurses' demographic characteristics and pain prevalence (n=2458).

Characteristics	Indexes	Pain prevalence during the last week Yes [n (%)]		χ^2	*P*
Age	≤30	508	(55.9)	10.759	**0.001***
	>30	761	(49.1)		
Tertiary Hospital	Yes	1073	(49.7)	24.990	**0.000***
	No	196	(65.1)		
Nurse manager	Yes	84	(58.3)	20.754	0.097
	No	1185	(51.2)		
Night Shift	Yes	351	(56.2)	6.895	**0.009***
	No	918	(50.1)		
Marital Status	Married	762	(54.2)	8.929	**0.003***
	Single	507	(48.1)		
Years of Experience	1–5	532	(47.8)	18.507	**0.000***
	6–10	370	(51.5)		
	>10	367	(58.5)		
Department	Surgery	434	(51.9)#	25.282	**0.000***
	Medicine	426	(50.5)#		
	General	129	(42.7)#		
	ICU	149	(63.7)		
	Emergency	73	(51.0)#		
	Outpatient	58	(58.0)#		

* Emphasize that *P*<0.05. # *P*<0.05 *vs.* ICU department. The pain prevalence in the other departments was significantly lower compared to that in ICU department.

Table 6. Multivariate model of pain prevalence.

Variables		OR (95% CI)	*P* values
Age (years)	>30 *vs.* ≤30	1.015 (0.718–1.321)	0.909
Marriage	Married *vs.* single	1.091 (0.899–1.324)	0.377
Hospital grade	Tertiary *vs.* non-tertiary	0.538 (0.416–0.695)	0.000
Department	ICU *vs.* non-ICU	1.930 (1.454–2.562)	0.000
Years of experience	>10 *vs.* ≤10	1.508 (1.145–1.987)	0.003
Shift	Yes vs. No	1.347 (1.113–1.629)	0.002

OR – odd ratio; CI – confidence interval.

countries. However, studies have shown that nurses in developed countries are more likely to seek medical attention and, under the guidance of doctors, take appropriate medication in a timely manner [7].

The survey data shows a correlation between the level of the hospital and the incidence rate of pain among nurses; the rate is lower in tertiary hospitals. A foreign study showed that the type of hospital is correlated to the incident rates of nurses' back pain. Small hospitals may restrict nurses' working posture and increase pain incidence rate due to limited space [12,13]. The Chinese system of hospital classification separates hospitals based on their function, facility, technical strength, and other comprehensive assessment criteria. To obtain the qualification of a tertiary level hospital, it needs to have the highest standards, the best facilities, and the best environment;

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all of which provide a positive working environment for the staff. At the same time, tertiary level hospitals usually pay more attention to on-the-job training and they also provide the most comprehensive training. Thus, tertiary level hospitals have relatively lower incident rates of pain among nurses.

The data shows different pain incidence rates for nurses from different departments. This suggests a correlation between the department the nurse belong to and the incidence rate of pain. Rodriguez et al. reported that the occurrence of lower back pain in nurses is closely related to heavy physical activity [14]. Lee and other Chinese surveys found that repeated stooping is one of the major factors for muscle tension damage [15]. Compared to other departments, the occupational risks for nurses in the ICU and emergency room are much higher due to the lack of ergonomics, as well as the heavier work intensity. Therefore, nurses from these 2 departments are more likely to have work-related pain such as lower back pain [16].

This study found that the time that nurses spent in this profession also played a major role in causing pain. Our data show that more time spent in the nursing profession is correlated with higher incidence and intensity of pain. Previous studies have not paid much attention to this subject, but the present study suggests that it may be related to a variety of reasons.

Studies show that nurses with higher education levels have better pain self-management [17]. In China, most older nurses have not received higher education, or even formal education. In addition to family influences, they experience many other forms of interference, resulting in a generation of nurses that are often unable to fully accept new concepts and knowledge. Therefore, their pain self-management level is lower than that of younger nurses, and this group thus has a higher incidence of pain. Furthermore, we found that in China, nurses with more experience are often given more responsibilities such as mentoring, teaching classes, inspection, and supervision, alongside their routine work. This increases their work load and can often lead to working longer hours, exposing them to bad postures for longer periods of time. Studies show that the intensity and frequency of somatic pain increase greatly when one works longer and harder hours [18].

This research discovered that shift times has a rather large influence; nurses on night shift were more likely to have pain compared to day shift nurses. A study by Nasrabadi et al. found that nurses on night shifts are highly susceptible to body pain, especially in the waist and back regions, with an incidence rate 3 times that of those working day shifts. The study suggests an association with sleeping disorders in those working the night shift, leading to a possible buildup of muscle tension in the waist and back [19]. In China, the shortage of nurses is indisputable, as there are data showing that there are only 2.5 nurses for every thousand patients in China [20,21]. This shortage led to the poor state of long-term Chinese clinical nursing resource management, especially for night shift, where there is often only 1 nurse on duty in each department. Needless to say, this places much pressure on night shift nurses. From this perspective, the high incidence of pain in nurses working the night shift in mainland China is easily explained.

Summing up the above observations, the main influencing factors of pain in nurses in mainland China are occupational factors. High-intensity workload and prolonged exposure to bad posture, hospital environmental factors, and ineffective management give rise to an increasing incidence rate of pain among nurses. Moreover, the pain self-management level of nurses in mainland China is still rather low, and this impedes efforts to improve the situation. Therefore, authorities should strive to improve nurses' work environment, increase their numbers, manage resources more effectively, and actively strengthen nurses' pain self-management proficiency, so as to reduce the pain experienced by nurses working in mainland China.

Conclusions

Our study found that many nurses experience physical pain (52.6%) within the last week. The pain intensity was mainly moderate to severe and affected different body regions. The back and lower limbs are particularly common locations of pain (58.3%) in our nurses' group. Lumbar spondylosis, dysmenorrhea, and cervical spine disorders are the main pain disorders for nurses. The high prevalence and poor satisfaction with pain management for nurses in mainland China raise concern with respect to nurses' pain-related health care. Nightshift nurses, nurses with more than 10 years working experience, and nurses who worked in tertiary hospitals and in ICUs were more likely to have pain, and more attention should be given to these groups. Health policy makers should pay more attention to occupational health to prevent pain and create a healthy work environment for nurses.

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Conflict of interests

None.

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