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Prevalence of depressive symptoms and work-related risk factors among nurses in public hospitals in southern China: A cross-sectional study

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Poor mental health among nurses not only hinders professional performance but also affects the quality of healthcare provided. To improve the prevention and management of depression among nurses in mainland China, we investigated the association between working conditions and depressive symptoms using a cross-sectional study with a sample of 3474 nurses with more than 1 year of work experience in public hospitals in Shenzhen in southern China. Participants completed a structured questionnaire and a validated measure of depressive symptoms. Multivariable linear mixed models were used to identify work-related risk factors for depressive symptoms scores. An estimated 38% of nurses had depressive symptoms. More than 10% of the nurses often experienced workplace violence, and 64.22% encountered it occasionally. Depressive symptoms were associated with frequent workplace violence, long working hours (more than 45 hours per week), frequent night shifts (two or more per week), and specific departments. These findings indicate that interventions to minimize workload and improve nurse–patient relationships are essential to combat depressive symptoms among nurses. Additionally, in the prevention and management of depression among nurses, we must consider inter-department differences.

Nurses are indispensable to the healthcare system and their well-being and work performance has a considerable effect on the quality of hospital healthcare. Nursing is invariably considered a stressful occupation within the healthcare system, and nurses experience a variety of occupational stressors (e.g., heavy workload, insufficient time for patient care, irregular work schedule, poor work environment, and difficult patients)¹. These may negatively affect the health status of nurses, which might then hinder their professional performance and affect the quality of healthcare provided^{2–5}. These issues will inevitably have negative effects on patients' health. Therefore, nursing managers and hospital administrators have recently become more interested in the health status of nurses.

Depression is a common mental disorder, with a prevalence of 14.6% among adults in high-income countries and 11.1% in developing countries^{6,7}. It is estimated that depression will become the second-leading cause of disability-adjusted life years lost by the year 2020⁸. Previous studies have suggested that depression may also be a pervasive problem among nurses. In the USA, a study showed that the prevalence of depressive symptoms among nurses was 41%, but another reported it to be 18%^{2,9}. In France, a third of nurse managers in hospitals were found to suffer from depressive symptoms¹⁰. In Canada, 1 in 10 nurses show depressive symptoms¹¹. Although the discrepancy in depressive symptoms prevalence among nurses across countries may partly due to the vast diversity of criteria used to measure depressive symptoms, it also indicates that there may be discrepancies in the incidence of depressive symptoms among nurses in different countries, which may be associated with social-cultural factors, nurses' personalities, and the healthcare system. Therefore, it is necessary to conduct further studies in different areas to obtain more comprehensive knowledge about the epidemiology and risk factors for depressive symptoms among nurses.

There are a significant number of nurses in China, with 2.5 million registered nurses in 2013. The socio-economic and professional statuses of Chinese nurses are different from those of nurses in other countries. First, nurses lack professional status due to the fact that clinicians occupy a dominant position in the Chinese healthcare



system¹². Nurses are considered to be subordinate to clinicians; they have marginal socioeconomic status, and pervasive sociocultural stigma is attached to being or becoming a nurse. Second, nurses in Chinese hospitals work with heavy workloads but low salaries. They are often the first target for cost cutting, and hospital administrators often hire fewer nurses when possible in order to cut costs, and Chinese hospitals are consequently experiencing serious nursing shortages^{13,14}. There are fewer nurses per patient in Chinese hospitals when compared with other countries, such as the USA¹⁵. Nurse income is also very low in China, and a previous study reported salary gaps between China and the USA as great as 50 times¹². Even for positions with such low salaries, nurses often must resort to bribery through the so-called ‘back door’ in order to secure a job¹². Such practices are not only illegal (although widespread in China), but also degrading and humiliating for nurses and their families. It is reported that a sense of personal achievement and job satisfaction among nurses in China is far lower than that in other countries¹⁴.

We hypothesized that mental health status among nurses in China is different from that of nurses in other countries due to their relatively low socioeconomic and professional status. However, few studies have concentrated on depressive symptoms of nurses in China, and even fewer have investigated this question with a large sample. Therefore, the primary purpose of this study was to assess the prevalence of depressive symptoms among Chinese nurses. At the same time, the working conditions of nurses in China are becoming an issue of social focus, with particular attention to the severe workplace violence in hospitals. Although a large number of researchers have demonstrated the role of working conditions on depressive problems among nurses, the evidence from China is limited. Another purpose of our study was to identify the relationship between work-related risk factors and depressive problems among nurses in China.

Results

Table 1 presents participant characteristics. The mean age of participants was 31.93 (SD = 7.55). The majority (98.76%) were female, and only 13.27% of participants had a bachelor’s degree. Less than one third (30.58%) reported good self-perceived physical health, and

almost half reported at least one kind of diagnosed chronic physical disease. Approximately 90% did not exercise regularly.

The prevalence of depressive symptoms according to work-related characteristics is presented in Table 2. There were 1320 nurses with depressive symptoms, giving an overall prevalence of depressive symptoms of about 38%. Among all nurses, 13.21% worked 60 hours or more per week, and 20.82% had two or more night shifts per week. More than 10% of participants often experienced workplace violence, and 64.22% encountered it occasionally. Pearson chi-square tests and Cochran–Armitage trend tests showed that all work-related variables were significantly associated with depressive symptoms. The probability of depressive symptom increased with increases in hospital grade, frequency of workplace conflict, work hours, and night shifts per week. Additionally, pairwise comparisons between work departments indicated that the prevalence of depressive symptoms in the departments of surgery, pediatrics, dermatology and venereology (D&V), ear, nose, and throat department (ENT) were significant higher than that in the departments of obstetrics and gynecology (O&G) and other departments (e.g., psychiatry, traditional Chinese medicine, rehabilitation, and administration). The prevalence of depressive symptoms in the departments of surgery and ENT was significantly higher than that in the department of internal medicine and the intensive care unit (ICU), which in turn was significantly higher than depressive symptoms prevalence in the other departments.

The results from the multivariable linear mixed model are presented in Table 3. Almost all work-related variables, except hospital grade and job title, were significantly and independently associated with depressive symptoms scores. Nurses exposed to more violence at work; who worked in the internal medicine, ICU, surgery, ENT, pediatrics, or D&V departments; who worked more than 45 hours per week; or who had two or more night shifts per week were more likely to suffer from depressive symptoms.

Discussion

We assessed the status of depression among nurses in China and explored the association between work-related factors and depressive symptoms. Our study demonstrated that depressive symptoms were common among nurses. According to previous Chinese studies that applied the Zung Self-Rating Depression Scale (SDS) to assess depressive symptoms with a standard score of 53 as the cut-off point, the prevalence of depressive symptoms in nurses working in city general hospitals ranged from 32.0% to 45.3%^{16–18}. The prevalence among nurses in our study (38.00%) was within the range of rates reported in previous studies.

However, the mean standard SDS score among our study participants (49.29 ± 12.20) was greater than the national norm score (41.88 ± 10.57) for the Chinese general population. Additionally, in comparison with other health professionals in China, the prevalence of depressive symptoms among nurses was higher. For example, Shen et al., using an identical evaluation method, reported that 31.7% of primary care physicians in Shanghai had depressive symptoms¹⁹. Comparing the prevalence of depressive symptoms in nurses across countries would be difficult at present, as measures of depressive symptoms differ across studies. If the measurement-related differences are not taken into consideration, the prevalence of depressive symptoms among nurses in China is relatively high. The highest reported prevalence of depressive symptoms (52.5%) was found among nurses in a general hospital in Taiwan²⁰, but another study in Taiwan reported that the prevalence was 27.7% among nurses in a psychiatric hospital²¹. The prevalence ranged from 10% to 40% in Canada, France, and the USA^{2,9–11}. Thus, the high prevalence of depressive symptoms among Chinese nurses warrants further investigation.

The relatively high prevalence of depressive symptoms among nurses in China may be attributable to various factors. First, a heavy

Table 1 | Characteristics of the study participants (N = 3,474)

Variables	N	%
Age, years (mean \pm standard deviation)	31.93 ± 7.55	
Gender		
Male	43	1.24
Female	3431	98.76
Education level		
High school or less	1309	37.83
Vocational School	1692	48.90
Bachelor degree	459	13.27
Marital status		
Married/cohabitation	2317	66.85
Single/widow/divorced	1149	33.15
Self-perceived Health Status		
Good/very good	1057	30.58
Fair	1928	55.79
Bad/very bad	471	13.63
Chronic disease		
No	1898	55.11
Yes	1546	44.89
Sleeping times (hours)		
≥ 8	641	18.48
6–8	2694	77.68
<6	133	3.84
Physical exercise		
Yes	383	11.09
No	3070	88.91

**Table 2 | Descriptive statistics for the work-related characteristics and associations with depressive symptoms**

Work-related variables	All subjects		Depressive symptoms		Z	P
	n	%	No	Yes		
Number of nurses	3474	100	2154	1320		
Hospital grade					-2.13	0.03
1	342	9.84	68.71	31.29		
2	1970	56.71	61.57	38.43		
3	1162	33.45	60.76	39.24		
Job title					14.81 ^a	<0.01
Intermediate or higher	1024	29.84	66.89	33.11		
Elementary or less	2408	70.16	59.93	40.07		
Work department^b					77.46 ^a	<0.01
Internal medicine/ ICU	937	27.07	58.70	41.30		
Surgical/ ENT	609	17.59	54.35	45.65		
O&G	518	14.96	64.09	35.91		
Pediatrics/ D&V	227	6.56	47.58	52.42		
others	1171	33.82	70.62	29.38		
Frequency of conflicts and violence					-12.16	<0.01
None	839	24.27	74.37	25.63		
Occasionally	2220	64.22	61.67	38.33		
Often	398	11.51	37.19	62.81		
Working hours/week					6.74	<0.01
35–44	1617	47.05	67.35	32.65		
45–59	1366	39.74	59.15	40.85		
≥60	454	13.21	51.54	48.46		
Shift work/ week					5.54	<0.01
0	1123	32.85	68.66	31.34		
1	1584	46.33	60.10	39.90		
≥2	712	20.82	56.46	43.54		

^aThe statistic values are associated with chi-square tests.^bICU: Intensive Care Unit; ENT: Ear, Nose and Throat; O&G: Obstetrics and Gynecology; D&V: Dermatology and Venereology; and other includes psychiatry, traditional Chinese medicine, rehabilitation, and administration departments.**Table 3 | Fixed effects parameter estimates in the multivariable linear mixed linear model (N = 3,220)**

Parameter	Estimate	SE	t	P value
Intercept	37.89	1.85	20.51	<0.01
Hospital grade				
1	0.15	0.94	0.16	0.87
2	0.66	0.69	0.97	0.33
3	0.00	0.00	-	-
Work department				
Internal medicine/ ICU	1.08	0.52	2.10	0.04
Surgical/ ENT	2.22	0.57	3.87	<0.01
O&G	0.76	0.59	1.27	0.20
Pediatrics/ D&V	2.19	0.81	2.70	0.01
Others	0.00	0.00	-	-
Job title				
Elementary or less	0.91	0.57	1.61	0.11
Intermediate/Senior	0.00	0.00	-	-
Frequency of conflicts and violence				
Often	6.46	0.70	9.18	<0.01
Occasionally	1.79	0.46	3.92	<0.01
None	0.00	0.00	-	-
Working hours/week				
≥60	2.74	0.62	4.45	<0.01
45–59	1.78	0.41	4.30	<0.01
35–44	0.00	0.00	-	-
Shift work/week				
≥2	1.53	0.59	2.58	0.01
1	0.62	0.49	1.27	0.20
0	0.00	0.00	-	-

The model was adjusted for age, gender, education level, marital status, self-perceived health status, chronic disease, sleeping time, physical exercise, and other variables in the model.

workload with a shortage of workers is a serious problem in China. Although the number of nurses in China has increased over the past few years, China is still facing a critical nursing shortage. By the end of 2012, the number of registered nurses was about 2.5 million, and the number of nurses per 1000 people was 1.85²². The nurse-to-doctor ratio was 0.97, which is lower than the national essential configuration standard (1 : 1), and much lower than the global average level (2 : 1) and the level for developed countries (4 : 1)^{22,23}. Nurses often report feeling frustrated when they do not have sufficient time to provide emotional support for the patient. Second, medical disputes often occur within healthcare institutions, and the nurse-patient relationship is often unsatisfactory. A previous study revealed that 41.3% of nurses sometimes or frequently/always felt irritable with regard to relationships with patients²⁴, and in the present study, about three quarters of nurses sometimes or often encountered workplace violence. Third, nurses have relatively low socioeconomic and professional status in the Chinese healthcare system.

Regarding the association between depressive symptoms and work-related conditions, workplace violence was an important predictor of nurses' mental health in our fully adjusted multivariable linear mixed model. Nurses who often experienced workplace violence were found to have higher SDS scores compared to those who seldom or never encountered it. Previous investigations indicated that workplace violence is a strong predictor of psychological conditions (e.g., depression) among exposed employees^{25,26}. In our study, almost a tenth of nurses often encountered workplace violence and almost two thirds encountered it occasionally. Improving the nurse-patient relationship is a critical challenge for China that warrants the concern of health administrators and researchers.

According to the fixed effects parameter estimates for work department, nurses working in the internal medicine, ICU, surgery, ENT, pediatrics, and D&V departments were more prone to depressive symptoms than those who work in the departments of psychiatry,



traditional Chinese medicine, rehabilitation, and administration. Two studies have reported on the prevalence of depression among nurses in different hospital departments, and both reported that the prevalence differs across departments^{10,27}. Consequently, in the prevention and management of depression among nurses, we must consider inter-department differences.

In addition, our results indicate that nurses who work more than 45 hours per week, as well as those who work two or more night shifts per week, were at greater risk of experiencing depressive symptoms, confirming the findings of previous studies, which have demonstrated a significant positive association between long working hours and frequent shift work and depressive symptoms^{28,29}. The positive associations between working hours (more than 45 hours per week) and frequent night shifts (two or more per week) and depressive symptoms should be carefully considered by hospital administrators and other parties responsible for scheduling nurses.

This study had a few limitations. First, because this was a cross-sectional study, we cannot establish causality between work-related risk factors and depressive symptoms. Additional longitudinal studies should be conducted to confirm the present conclusions. Second, aggression and violence among nurses was measured with a single item rather than a specific and validated scale. Third, some other work-related conditions, such as relationships with colleagues, were not considered. Furthermore, the sample was drawn from nurses working in public hospitals in a southern city in China, and thus, the conclusions must be tested in other regions and different types of health facilities in China.

Methods

Participants and sampling. This cross-sectional study was implemented from June to October 2009 in the city of Shenzhen, Guangdong Province (Southern China). It used a stratified sample design. First, there were 59 public hospitals in Shenzhen, all of which were recruited in our study. Second, one quarter of nurses with at least 1 year of service at the sampled hospitals were randomly selected from each hospital. Then, the selected nurses assembled at their own hospital and completed self-administered anonymous questionnaires on the spot. Of 14,530 eligible nurses, 3633 were randomly selected, of whom 159 (4.37%) refused to participate. Finally, 3474 remaining participants completed the questionnaires.

Depressive symptoms were measured using the validated Chinese version of the 20-item SDS, which has well-established reliability and was designed for use among the general population. It measures the level of depressive symptomatology within the last week^{30,31}. Each item is given a severity score ranging from 1 (very seldom presence of anxiety/depression symptoms) to 4 (anxiety/depression symptoms are almost always present). The total score was computed as an original score, and then multiplied by 1.25 to obtain the standard score. A score of 53 or higher represents presence of depressive symptoms^{31,32}. In the present study, Cronbach's alpha of the scale was 0.88, indicating good internal consistency. To reduce information loss, all missing SDS values were replaced with the calculated mean of a given participant's responses to other scale items.

Based on a review of previous literature, six work-related characteristics were measured: hospital grade, work department, job title, work hours per week, night shift rotation period, and the frequency of nurse–patient conflicts and violence (e.g. “Over the past 12 months, how often did you encounter verbal abuse, threats, intimidation or physical violence from patients and their families?”).

Additionally, data on other potential risk factors were collected, including socio-demographic characteristics (gender, age, educational level, and marital status), sleeping time, physical exercise, chronic disease, and self-perceived physical health status. Self-perceived physical health was measured using a single 5-point Likert scale question ranging from 1 (very bad) to 5 (very good).

All statistical procedures were performed using the Statistical Analysis System (SAS) 9.2 for Windows (SAS Institute Inc., Cary, NC, USA). Descriptive analyses were conducted on socio-demographic data, sleeping time, physical exercise, chronic disease, and self-perceived physical health status. The prevalence of depressive symptoms was calculated and compared to work-related variables. Pearson chi-square tests were conducted to compare the prevalence of depressive symptoms between groups, such as job title and work department. Cochran–Armitage trend tests were employed to evaluate the relationship between depressive symptoms and the rank work-related variables (hospital grade, frequency of conflict, working hours per week, and night shifts per week). Cochran–Armitage trend test analyses for trend in binomial proportions across levels, which is appropriate for a two-way table where the response variable has two levels and the explanatory variable is ordinal. In addition, multivariable linear mixed models, a model useful in settings where measurements are made on clusters of related statistical units, were used to examine the associations of independent variables with nurses' SDS scores. First, a model was fitted with only hospital entered as a random effect to determine the within-hospital

intra-class correlation coefficient (ICC). The ICC was 0.04 with a p-value of 0.0007. Second, all independent variables, including work-related variables, socio-demographic variables, sleeping time, physical exercise, chronic disease, and self-perceived physical health, were added as fixed effects in the model adjusted for hospital clustering. All comparisons were two-tailed. The significance threshold was 0.05.

The study was performed in accordance with the principles of the Declaration of Helsinki and was approved by the Research Ethics Committee in Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China. All the participants read the purpose statement of the investigation and each provided a written informed consent.

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Author contributions

G.Y., R.Z., Z.L. and Y.C. designed the study, G.Y., R.Z. and Y.C. participated in the acquisition of data, which were analyzed by Y.G. and X.Y., Y.G., T.H. and X.Y. drafted the manuscript and T.H. and Z.L. revised the manuscript. All authors reviewed the manuscript.

Additional information

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