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Suboptimal health status of nurses in Wuhan, China during the COVID-19 outbreak

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SUMMARY

OBJECTIVE: This study analyzes the suboptimal health status (SHS) and influencing factors of nurses in Wuhan Hospital, China during the coronavirus disease 2019 (COVID-19) outbreak.

METHODS: This study was conducted through an online survey, from March 1–7, 2020, in Wuhan, China. The data collection tools, such as Suboptimal Health Status Questionnaires, Generalized Anxiety Disorder, and Chinese version of the Perceived Stress Scale, were used.

RESULTS: The average value of suboptimal health status was 28.44 (standard deviation=15.15). The overall prevalence of SHS was 35.1%. Suboptimal health status of the nurses was significantly different based on their gender, age, whether they directly care for COVID-19 patients, anxiety level, and stress perception expect education. Multivariate analysis found that average sleep times per day, female, age, directly participate in the rescue of COVID-19, self-infection, and anxiety were the influencing factors of suboptimal health status.

CONCLUSIONS: First-line nurses have poor suboptimal health status in Wuhan.

KEYWORDS: Health. Nurses. Anxiety. China. COVID-19.

INTRODUCTION

At the end of December 2019, the first patient with clustering pneumonia of unknown was discovered in Wuhan, Hubei province, China[1]. The World Health Organization (WHO) has confirmed that unknown pneumonia is caused by a new coronavirus (2019-nCoV). Due to the interpersonal transmission of coronavirus disease 2019 (COVID-19)[2], it quickly spread throughout the world, and the number of suspected and confirmed cases worldwide increased exponentially. The WHO declared COVID-19 as a public health emergency of international concern on January 30, 2020[3]. In the process of combating infectious diseases, frontline medical staff are facing enormous psychological and physical pressure. The first-line nurses not only have to take care of the diagnosed and suspected patients but also face the risk of COVID-19 and bear the double pressure of body and mind[4]. Anxiety, depression, insomnia, and other serious threats to the physical and mental health of the first-line nurses[5] may lead to a decline in the immune system and often cause nurses to have suboptimal health status (SHS)[6]. Yan et al demonstrated the relationship between chronic psychological stress and SHS[7]. SHS is a moderate state of health between health and disease, which is described as weakness, chronic fatigue, decreased physical function, and ability to adapt[8]. Previous studies have shown that the increased burden of cardiovascular disease and other chronic diseases is also caused by SHS[6]. Therefore, SHS may have a huge impact

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on the physical and mental health of nurses, the quality of hospital care, and patient safety. However, most of the earlier studies have focused on investigating the prevalence of depression and anxiety among nurses[5,9]. Few studies have focused on the SHS of first-line nurses during the COVID-19 outbreak. The advantage of our research is that this is the first study to investigate the SHS and analyze its related factors of frontline nurses during COVID-19 in Wuhan, China.

METHODS

Participants

This study was conducted through an online survey with the questionnaire star, from March 1–7, 2020, in Wuhan, China. Participants are nurses working in the n°8 Hospital in Wuhan.

Measurement of demographic characteristics

This mainly includes the basic information of the participants, such as gender, age, occupation, marital status, education level, whether infected with COVID-19, and whether responsible for nursing COVID-19 patients.

Suboptimal health status questionnaires

A self-reported questionnaire Suboptimal Health Status Questionnaires (SHSQ-25) was used to assess SHS[7]. The questionnaire included 25 items and encompassed 5 subscales as follows: fatigue, cardiovascular system, digestive tract, immune system, and mental status. Each subject was asked to rate a specific statement on a 5-point Likert-type scale based on how often they suffered various specific complaints in the preceding three months. A high score represents a high level of SHS (poor health). A total score of more than 35 points indicates the state of suboptimal status. The Cronbach's α was 0.95 in the current sample.

Generalized anxiety disorder

The anxiety of the participants over the past two weeks was assessed by the Generalized Anxiety Disorder (GAD-7). Each item of the GAD-7 is scored from 0 (not at all) to 3 (nearly every day), and the total score is from 0–21. Respondents who scored five or higher were indicated anxiety symptoms[10]. The Cronbach's α was 0.95 in the current sample.

Chinese version of the perceived stress scale

The Chinese version of the Perceived Stress Scale (CPSS) was used to measure the stress status. This scale comprised 14 items that addressed perceptions of stress during the month prior to the survey. The items were rated on a 5-point Likert-type scale and ranged from 0 (never) to 4 (very often). Following previous practice, we defined the severe stress when the CPSS score ≥25[11]. The Cronbach's α was 0.82 in the current sample.

Statistical analyses

The data were analyzed using SPSS software version 21 for the statistics of the data. The χ^2 test analysis and the binomial logistic regression analysis were used to test the influencing factors of SHS. $p<0.05$ was considered statistically significant.

RESULTS

Risk factors for suboptimal health status

The χ^2 test analysis of variance was used to test the differences in SHS among categorical variables and is shown in Table 1. Female, older, directly nursing COVID-19 patients, infected with COVID-19, anxiety, and severe stress were more likely to suffer SHS. In addition, those who reported longer average sleep times per day and self-rated good physical health were less likely to suffer SHS. There were no significant differences on educational level.

Multiple logistic regression analysis

A binomial logistic regression analysis was performed (Table 2). Self-rated good physical health and longer average sleep times per day were protective factors. Female, age, direct contact with COVID-19 patients, infected with COVID-19, anxiety, and severe stress were six risk factors for SHS.

DISCUSSION

This study investigated the SHS and related factors of nurses during the COVID-19 in Wuhan, China. The results found that the incidence of SHS was 35.1% lower than the results of Liang et al.[6]. Liang et al. found that the incidence of SHS was 49% during a cross-sectional survey of medical personnel over the age of 40. This difference may be due to the fact that the majority of the participants in our study were relatively young (21–40 years old accounted for 82.3%), and the mental and physical conditions of the young nurses were generally better. In addition, at the time of our investigation, it was nearly three months before the first COVID-19 patient was diagnosed in Wuhan. New coronary pneumonia has been controlled in China. As of March 9, 2020, the number of newly diagnosed cases of COVID-19 dropped sharply from 3,000 cases to less than 20 cases[12]. Hundreds of medical teams with more than 30,000 people across the country arrived in Wuhan to fight against the COVID-19[13], and the work pressure of nurses in Wuhan hospitals has been significantly

Table 1. The differences of suboptimal health status among categorical variables.

	Number of cases	SHS		χ^2	p-value
		No	Yes		
	n(%)	n(%)	n(%)		
Gender				7.485	0.006
Male	99(3.6)	77(77.8)	22(22.2)		
Female	2661(96.4)	1714(64.4)	947(35.6)		
Age group (years)				32.294	<0.001
20–25	683(24.7)	498(72.9)	185(27.1)		
26–30	829(30.0)	535(64.5)	294(35.5)		
31–35	587(21.3)	371(63.2)	216(36.8)		
36–40	308(11.2)	183(59.4)	125(40.6)		
41–45	149(5.4)	86(57.7)	63(42.3)		
46–50	142(5.1)	84(59.2)	58(40.8)		
≥51	62(2.2)	34(54.8)	28(45.2)		
Education				3.447	0.328
Professional school	22(0.8)	15(68.2)	7(31.8)		
Junior college	588(21.3)	400(68.0)	188(32.0)		
Undergraduate	2112(76.5)	1351(64.0)	761(36.0)		
Graduate or above	38(1.4)	25(65.8)	13(34.2)		
Average sleep times per day (h)				138.843	<0.001
5	165(6.0)	64(38.8)	101(61.2)		
6	806(29.2)	443(55.0)	363(45.0)		
7	1102(39.9)	756(68.6)	346(31.4)		
8	611(22.1)	461(75.5)	150(24.5)		
≥9	76(2.8)	67(88.2)	9(11.8)		
Self-rated physical health				350.388	<0.001
Very poor	51(1.8)	20(39.2)	31(60.8)		
Poor	180(6.5)	55(30.6)	125(69.4)		
Fair	1398(50.7)	772(55.2)	626(44.8)		
Good	917(33.2)	742(80.9)	175(19.1)		
Very good	214(7.8)	202(94.4)	12(5.6)		
Direct contact with COVID-19 patients				79.278	<0.001
No	1963(71.1)	1375(70.0)	588(30.0)		
Yes	797(28.9)	416(52.2)	381(47.8)		
Infected with COVID-19				13.055	<0.001
No	2667(96.6)	1747(65.5)	920(34.5)		
Yes	93(3.4)	44(47.3)	49(52.7)		
Anxiety				740.964	<0.001
No	1651(59.8)	1406(85.2)	245(14.8)		
Yes	1109(40.2)	385(34.7)	724(65.3)		
Severe stress				418.889	<0.001
No	1403(50.8)	1167(83.2)	236(16.8)		
Yes	1357(49.2)	624(46.0)	733(54.0)		

SHS: suboptimal health status.

reduced. Most general hospitals in Wuhan have established a shift system to take turns to care for COVID-19 patients[13], which allows the nurses to get adequate rest.

Compared with men, female nurses are more likely to have higher levels of SHS, which may be related to the physiological and psychological differences between genders[14]. Studies have also found that female nurses have more severe depression and anxiety symptoms[5]. It is worth noting that female nurses also need to face the discomfort of special physiological conditions during the COVID-19, especially wearing protective clothing and protective glasses for a long time, which will consume more physical and mental energies of female nurses. Our research also found that the shorter the average daily sleep time for nurses, the higher the risk of SHS. In a recent report, Singhal (2020) found that the SHS of Chinese adults is closely related to less than 6 h of sleep per day[15]. Our research shows that about one-third of nurses sleep less than 6 h per day. Adequate sleep has an important impact on physical health, and people who lack sleep will express more negative emotions[15]. Our research shows that age is related to SHS. Compared with nurses aged 21–25, nurses of other ages have a significantly higher chance of developing SHS. This may be related to the law of human development. With the increase of age, individual functions and physical conditions begin to gradually decline. Therefore, older nurses increase the risk of SHS, such as insomnia, fatigue, and weakened immune systems.

Table 2. Binomial logistic regression analysis of suboptimal health status.

	B	SE	Odds Ratio	p-value
Demographic data				
Gender (reference male)	0.665	0.296	1.944	0.025
Age (years) (reference 20–25)				
26–30	0.453	0.141	1.573	0.001
31–35	0.508	0.153	1.662	0.001
36–40	0.761	0.182	2.140	<0.001
41–45	0.704	0.238	2.021	0.003
46–50	0.889	0.249	2.434	<0.001
≥51	1.253	0.351	3.501	<0.001
Average sleep times per day (h) (reference 5 h)				
6	-0.233	0.221	0.792	0.293
7	-0.505	0.220	0.603	0.022
8	-0.604	0.235	0.547	0.010
≥9	-1.308	0.465	0.270	0.005
Self-rated health (reference very poor)				
Poor	0.202	0.402	1.224	0.615
Fair	-0.297	0.360	0.743	0.408
Good	-1.166	0.368	0.312	0.002
Very good	-2.249	0.480	0.105	<0.001
Direct contact with COVID-19 patients (reference n°)	0.591	0.117	1.805	<0.001
Infected with COVID-19 (reference n°)	0.508	0.256	1.661	0.048
Anxiety (reference n°)	1.774	0.107	5.893	<0.001
Severe stress (reference n°)	0.957	0.111	2.603	<0.001

B: regression coefficient; SE: standard error.

This study found that nurses who were directly involved in nursing COVID-19 patients were 1.81 times more likely to suffer from sub-health than nurses who were not directly involved in nursing COVID-19 patients, although both of these nurses work in the same high-risk area (Wuhan) and high-risk occupation (nursing). However, nurses who are directly involved in the care of COVID-19 patients must wear heavy, sealed, and high-temperature full-body protective equipment, including protective masks and protective clothing. Closer contact with patients with COVID-19 has a higher potential risk of infection, resulting in more physical and mental stress, which increases the risk of SHS. A total of 93 nurses infected with COVID-19 were included in this study. Once infected with COVID-19, nurses will have depression and anxiety, and most of them will also have physical symptoms such as cough and fever, which will obviously cause them to have more SHS.

Nurses often cannot live normally during the COVID-19, as they belong to a high-risk group and cannot return home after completing their work. They need to be isolated in the hotel, which will have a lot of negative effects on nurses. The longer the nurse is quarantined, the more likely anxiety, anger, and avoidance behaviors will occur[9]. Both overloaded stress and psychological distress can cause them to develop SHS. Our results confirm this conclusion. The prevalence of SHS among nurses in an anxious state is 1.77 times that of nurses in a non-anxious state. Therefore, giving first-line nurses relief of work pressure and providing necessary psychological counseling services may be the important tasks for the government and hospital administrators during the new coronary pneumonia.

CONCLUSIONS

First-line nurses have poor SHS in Wuhan. Average sleep times per day, female, age, directly participate in the rescue of

COVID-19, self-infection and anxiety were the influence factors of SHS. The results of this study can provide a reference for alleviating the SHS of nurses responding to COVID-19. Government and hospital managers should provide first-line nurses with medical security and psychological counseling services, reduce nurses' workload and night shifts, and increase support for nurses, thereby reducing nurses' stress levels and improving nurses' health.

AUTHORS' CONTRIBUTION

LH: Formal analysis, Writing - review & editing. **HL:** Conceptualization, Methodology, Data curation, Writing – original draft. **GW:** Formal analysis, Writing - review & editing. **XT:** Conceptualization, Methodology, Data curation, Writing – original draft. **YZ:** Conceptualization, Methodology, Data curation, Writing – original draft. **JF:** Writing – review & editing

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