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Research paper

Prevalence of depression and its impact on quality of life among frontline nurses in emergency departments during the COVID-19 outbreak

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ABSTRACT

Background: Frontline medical staff exposed to the novel coronavirus disease (COVID-19) could be psychologically and mentally exhausted. This study examined the prevalence of depressive symptoms (depression hereafter) and their correlates and the association between depression and quality of life (QOL) in Emergency Department (ED) nurses during the COVID-19 pandemic in China.

Methods: This national, cross-sectional online survey was conducted between March 15 and March 20, 2020 in China. Depression and QOL were measured using the 9-item Patient Health Questionnaire, and the World Health Organization Quality of Life Questionnaire-Brief Version, respectively.

Results: The overall prevalence of depression in 1103 ED nurses was 43.61% (95% CI = 40.68–46.54%). Multiple logistic regression analysis revealed that working in tertiary hospitals (OR = 1.647, $P = 0.009$), direct patient care of COVID-19 patients (OR = 1.421, $P = 0.018$), and current smokers (OR = 3.843, $P < 0.001$) were significantly associated with depression. After controlling for covariates, nurses with depression had an overall lower QOL compared to those without ($F_{(1,1103)} = 423.83$, $P < 0.001$).

Conclusion: Depression was common among ED nurses during the COVID-19 pandemic. Considering the negative impact of depression on quality of patient care and nurses' QOL, a heightened awareness of, and early treatment for depression for frontline ED nurses should be provided.

1. Introduction

In late 2019, the novel coronavirus disease (COVID-19) was first found in China. On the 30th January, 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern (World Health Organization, 2020). In order to reduce the rapid transmission of the COVID-19 and to take care of confirmed and suspected patients, additional services, such as fever clinics and isolation infectious units, have been set up in emergency departments (ED) in many hospitals (National Health Commission, 2020).

ED nurses often face enormous psychological pressure due to overwhelming workload, long hours, shift duties and working in a fast-paced and high-risk environment (Healy and Tyrrell, 2011; Hooper et al., 2010). Nurses working in such a physically and emotionally challenging situation frequently experience fatigue, burnout, mental exhaustion, and emotional detachment (Boyle, 2011). During

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the COVID-19 pandemic, frontline clinicians including nurses, especially those who have close contacts with infected patients, regularly experienced anxiety and depressive symptoms (depression hereafter), emotional breakdown and sleep disturbances due to the limited clinical knowledge of the new virus and the insufficient provision of protective gears and other medical supplies (Liu et al., 2020; Xiang et al., 2020a, 2020b), which may lead to poor morale at work, absenteeism, apathy, and poor work performance leading to patient dissatisfaction (Portnoy, 2011; Vahey et al., 2004).

Since the outbreak of the COVID-19, some studies have examined the epidemiology of psychiatric problems in frontline clinicians. For instance, a recent cross-sectional study reported that the prevalence of depressive, anxiety, insomnia and non-specific distress symptoms was 50.4%, 44.6%, 34.0%, and 71.5%, respectively in frontline clinicians including nurses (Lai et al., 2020). However, existing research has rarely investigated mental disturbances among frontline nurses working in different departments during the COVID-19 outbreak, although the prevalence estimates in different departments are important figures for health authorities to develop preventive strategies and effective treatment modalities to alleviate the negative outcomes of depression. To date no studies on the epidemiology of depression in ED nurses have been published. This study explored the prevalence of depression and its correlates and the association between depression and quality of life (QOL) in ED nurses during the COVID-19 pandemic in China.

2. Methods

2.1. Setting and sample

A national, cross-sectional online survey was initiated and conducted by the Psychiatry Branch, Chinese Nursing Association between March 15 and March 20, 2020 in China. The Snowball sampling method was used and the data were collected using the QuestionnaireStar program, a research application embedded with WeChat. The QuestionnaireStar programme is a popular research tool commonly applied in epidemiological surveys in China (Li et al., 2016; Xi and Liu, 2017). WeChat is a communication program employed by the Chinese Nursing Association for continuing education for all its members. In order to reduce disease transmission during the COVID-19 outbreak, face-to-face interviews could not be adopted. To be eligible, participants should be: (1) adults aged 18 years or above; (2) frontline nurses working in ED during the COVID-19 outbreak; (3) able to understand Chinese and provide written informed consent. The study protocol was approved by the Ethics Committee of the University of Macau, China.

2.2. Instruments

Basic demographic information included gender, age, marital status, educational background, work experience, shift duty, living circumstances, rank (junior/senior), type of hospital (primary/tertiary), work place (inpatient/outpatient), current smoking status, and work experience during the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak. Nurses were also asked three additional standardized questions whether (1) they were directly engaged in clinical services for patients with COVID-19; (2) their family, friends or colleagues were infected with the COVID-19; and (3) there were 500 or more confirmed COVID-19 cases in the province where they lived/worked.

Depression was measured with the Patient Health Questionnaire (PHQ)-Chinese version. The PHQ is a 9-item self-report instrument, which is widely used in clinical settings. Each item is scored from 0 to 3, with the total score of 5 or more indicating “depression” (Kroenke et al., 2010). A total score of 5–9 indicates ‘mild depression’; 10–14 ‘moderate depression’, 15–19 ‘moderate-to-severe depression’, and ≥20 ‘severe depression’ (Kroenke et al., 2010). The Chinese version of PHQ-9 demonstrated satisfactory psychometric properties (Cronbach's alpha = 0.89) (Chen et al., 2015; Leung et al., 2020).

Nurses’ QOL was assessed with the sum of the first two items on overall quality of life derived from the World Health Organization Quality of Life Questionnaire-Brief Version (WHOQOL-BREF) (Harper et al., 1998). Higher total scores indicate higher QOL (Skevington and Tucker, 1999). The Chinese version of this scale has satisfactory psychometric properties (Fang and Hao, 1999).

2.3. Data analysis

All the analyses were performed with the SPSS, Version 21.0. The normal distribution of continuous variables was examined with the Kolmogorov–Smirnov test. Demographic variables between the ‘Depression’ and No-depression’ groups were compared using the Chi-square tests, two samples independent sample *t*-tests, or Mann–Whitney *U* tests, as appropriate. To examine the independent demographic and clinical correlates of depression, multiple logistic regression analysis with the “Enter” method (i.e., entering all independent variables in the model simultaneously) was conducted. Depression was entered as the dependent variable, while all variables with a *P* value of <0.1 in the univariate analyses were the independent variables. Analysis of covariance (ANCOVA) was performed to compare the QOL between the two groups after controlling for variables with significant group difference in univariate analyses. Level of significance was set as $P<0.05$ for all tests (2-sided).

3. Results

A total of 1103 frontline ED nurses met the study criteria and completed the survey. The demographic characteristics of the sample are shown in Table 1. The overall prevalence of depression among ED nurses was 43.61% (95% CI: 40.68–46.54%). Of the depressed ED nurses ($N=481$), 305 (27.7%) reported mild depression, 95 (8.6%) reported moderate depression, 58 (5.3%) experienced moderate-to-severe depression, and 23 (2.1%) reported severe depression. The mean score of the PHQ-9 scale was 4.90 (SD = 5.40).

Univariate analysis revealed that depression was significantly associated with the type of hospital ($P=0.019$), direct care with confirmed COVID-19 patients ($P=0.006$), current smoking ($P<0.001$), years of work experience ($P=0.039$), and QOL ($P<0.001$). After controlling for covariates, depressed nurses had lower QOL compared to their not depressed colleagues ($F_{(1,1103)}=423.83$, $P<0.001$). Six independent variables were entered in the multiple logistic regression analysis (i.e., living with family, working in tertiary hospital, having COVID-19 infected families, direct contact with infected patients, current smoking, and length of work experience). Nurses working in tertiary hospitals (OR = 1.647, $P=0.009$), engaging in clinical services for COVID-19 patients (OR = 1.421, $P=0.018$), and current smokers (OR = 3.843, $P<0.001$) were significantly associated with higher risk of depression (Table 2).

4. Discussion

To the best of our knowledge, this was the first study that comprehensively examined the epidemiology and correlates of depression among ED nurses during the COVID-19 pandemic. Close to half (43.6%; 95% CI: 40.68–46.54%) of the ED nurses suffered from depression, which is similar to the findings reported by Lai et al. (2020) in Chinese frontline clinicians (50.4%). Another Chinese study using the same assessment tool found that 31.37% of frontline clinicians reported depression during the outbreak of COVID-19 (Zheng et al., 2020). Using the PHQ (cut-off of 10), Cui (2019) found that the prevalence of depression in Chinese ED nurses was 29.1%. ED is an ever-changing, highly regulated workplace, dealing with patients in critical conditions (Lu et al., 2015). ED nurses are responsible for a wide spectrum of clinical tasks, some of which may be life-threatening clinical situations and require immediate attention (Lu et al., 2015). The high work

Table 1
Demographic characteristics of emergency department nurses.

Variables	Total ($N=1103$)		No depression ($N=622$)		Depression ($N=481$)		X^2	df	P
	N	%	*N*	%	*N*	%			
Male gender	102	9.2	51	8.2	51	10.6	1.867	1	0.172
Married	710	64.4	395	63.5	315	65.5	0.465	1	0.495
College education and above	1073	97.3	603	96.9	470	97.7	0.604	1	0.437
Living with family	838	76.0	459	73.8	379	78.8	3.715	1	0.054
Junior nurses	747	67.7	429	69.0	318	66.1	1.014	1	0.314
Participation in treating SARS patients	184	16.7	105	16.9	79	16.4	0.041	1	0.840
Working in tertiary hospitals	961	87.1	529	85.0	432	89.8	5.490	1	**0.019**
Working in inpatient services	377	34.2	200	32.2	177	36.8	2.600	1	0.107
Shift duty	929	84.2	517	83.1	412	85.7	1.313	1	0.252
Local COVID-19 cases ≥ 500	156	14.1	93	15.0	63	13.1	0.768	1	0.381
Having family/friends/colleagues infected with COVID-19	90	8.2	43	6.9	47	9.8	2.957	1	0.086
Looking after infected patients	250	22.7	122	19.6	128	26.6	7.576	1	**0.006**
Current smoker	45	4.1	12	1.9	33	6.9	16.856	1	**<0.001**
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	***T/Z***	**df**	***P***
Age (years)	32.20	7.61	31.99	7.71	32.47	7.47	−1.031	1101	0.303
Work experience (years)	10.72	8.30	10.44	8.42	11.09	8.13	−2.068[a]	–	**0.039**
Total QOL score	6.33	1.60	7.08	1.35	5.35	1.34	21.242	1101	**<0.001**

a: Mann-Whitney U test; Bold values: P < 0.05; M: mean; SD: standard deviation; COVID-19: Corona Virus Disease 2019; SARS: Severe Acute Respiratory Syndrome; QOL: Quality of Life;

Table 2
Independent correlates of depression according to multiple logistic regression analysis.

Variables	Multiple logistic regression analysis		
	OR	95% CI	*P* value
Living with family	1.344	0.983–1.836	0.064
Working in tertiary hospitals	1.647	1.131–2.400	**0.009**
Having family/friends/colleagues Infected with COVID-19	1.399	0.899–2.179	0.137
Looking after infected patients	1.421	1.062–1.902	**0.018**
Current smoker	3.843	1.951–7.569	**<0.001**
Work experience (years)	1.007	0.992–1.023	0.361

Bold values: $P<0.05$; CI: confidential interval; OR: odds ratio; QOL: Quality of Life.

pressure, low level of control and autonomy and perceived powerlessness as revealed in a free-flowing interview of ED nurses could account for the higher risk of depression and related health problems (Severinsson, 2003). Besides, heavy workload, shift work, resuscitation and death were proven risk factors of psychological distress, particularly depression among ED nurses (Lim et al., 2010; Morrison and Joy, 2016; Winwood et al., 2006). During the COVID-19 outbreak, ED nurses were more likely to experience excessive workload, fatigue, helplessness, and feared high risk of infection. These factors could also be associated with the reported high prevalence of depression in ED nurses.

Nurses working in tertiary hospitals and those who looked after COVID-19 patients were more likely to suffer from depression. During the COVID-19 outbreak in China, 34 provinces, municipalities, and autonomous regions covering over a population of 1.3 billion initiated first-level responses to such a major public health emergency (Xiang et al., 2020a). Most tertiary hospitals in each province were designated as first-line emergency isolation hospitals/units to provide clinical services for suspected and confirmed cases of COVID-19 (National Health Commission, 2020). Compared to those in primary/community clinical settings, ED nurses in tertiary hospitals needed to have more frequent close contacts with infected patients as they were responsible for triage and initial care. The nature of work assigned to ED nurses led to higher level of stress and fear, which subsequently resulted in higher rate of depression.

Working in frontline clinical settings is an independent risk factor for poor mental health (Lai et al., 2020). During the 2003 SARS outbreak in China, almost 90% of the frontline clinicians in high-risk clinical settings reported psychological symptoms (Chua et al., 2004). Consistent with previous findings (Lai et al., 2020), frontline nurses who engaged in clinical care of COVID-19 patients were at higher risk of depression in the current study. ED nurses were required to work longer hours than ever due to the huge number of patients during the COVID-19 outbreak. After long working hours, all ED nurses had 14 days of mandatory quarantine, which could further exacerbate their anxiety and guilt because of the social stigma conferred on to their families. Furthermore, ED nurses also experienced fear of getting infected and spreading the virus to their families and friends. All these factors could substantially increase the risk of depression. Similar to previous findings (Li et al., 2017; Wang et al., 2020), current smoking was significantly associated with higher risk depression in this study. ED nurses had high-pressure jobs in clinical settings, and some of them may find smoking immediately relaxing despite of its long-term harmful effects.

According to the distress/protection model of QOL (Voruganti et al., 1998), QOL is determined by the interaction between protective (e.g., good social support and high socioeconomic status) and distressing factors (e.g., physical diseases and mental disorders). Considering the negative impact of depression on the quality of clinical practice and its symptom profile including hopelessness, helplessness, insomnia, cognitive impairment, and somatic complaints (Ivbijaro et al., 2019; Singleton, 2001), it is reasonable to assume that depressed nurses are far more likely to have lower QOL than nurses without depression. In this study depressed nurses reported lower QOL than those without, which echoed previous findings (Malhi and Mann, 2018; Sjoberg et al., 2020).

The strengths of this study included the large sample size and the use of standardized instruments on depression and QOL. However, there were several limitations. First, due to logistical reasons, some variables associated with depression, such as social support, collegial relationship, health status and pre-existing psychiatric disorders, were not examined. Second, because of the cross-sectional study design, the causality between depression and other variables could not be examined. Third, more than 90% of the participants were female nurses, which may have biased the findings to an uncertain extent.

In conclusion, depression is common among ED nurses during the COVID-19 outbreak. Considering the detrimental impact of depression on quality of life and quality of care (Ng et al., 2013), health authorities should organize regular screening targeting depression, and develop preventive measures to alleviate the risk of depression by providing a timely provision of financial support, online psychological counselling

service, on-site psychological guidance as well as offering psychiatric treatment for vulnerable nurses directly engaged in the treatment and care of COVID-19 patients.

Declaration of Competing Interest

The authors have no conflicts of interest to declare.

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