Impact of Central Quarantine Inside a Lockdown Hospital Due to COVID-19 Pandemic on Psychological Disorders among Health Care Staffs in Central Hospitals of Hanoi, Vietnam, 2020

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ABSTRACT: This study aims to examine the impact of undergoing a central quarantine due to the lockdown of Bach Mai hospital on the psychological disorders and identify associated factors with depression among hospital employees in central hospitals of Hanoi, Vietnam. Employing a cross-sectional design, the study collected data from staff working in the lockdown hospital and other central hospitals during 1 week after the lockdown happened. The sample size included 373 staff from 3 hospitals, the study time was. Depression was tested using PH-Q9 scale. Multivariate logistics regression was employed to test for the impact of central quarantine on depression and identify other significant related factors. The study confirmed a high burden of psychological issues that hospital employees were facing. Staff working in the lockdown hospital had 2.3 times higher odds of being perceived depression than others. Those who contact directly about 21 to 20 patients/day had 3.19-times higher odds of being perceived depression than others. Staff who being stigmatization associated with COVID-19 had 2.63 times higher odds of perceived depression than others. Reducing these associated factors to depression may help to reduce the psychological burden HEs have to cope with during the pandemic.

KEYWORDS: Patient health questionnaire, depression, COVID-19, hospital employees

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Introduction

The outbreak of novel coronavirus pneumonia (COVID-19) started in Wuhan (Hubei, China) in December 2019.[1] This pandemic arrived in Vietnam on January 23, 2020, and by the time of April 23rd, 2020, there were 268 confirmed cases, 224 recoveries, and no deaths.[2] Based on those figures, Vietnam's response has been praised for its well-organized epidemic control program with main strategies of minimizing the risk of transmission, control at the grass-root level, and rapid coordinated response at the early stage of the pandemic.[3] At the beginning, the COVID-19 confirmed cases in Vietnam were patients with a history of the movement from China and other countries, therefore it was possible to trace and isolate suspected cases.[2] On March 20, the pandemic marked a new phase with a risk of spreading in the community when 2 health care workers at Bach Mai Hospital were confirmed positive, with no history of contact with COVID-19. A series of new cases from this hospital confirmed during the week later had resulted in a decision from the Government to lock down the hospital to quarantine the center of the outbreak.

Previous studies reported psychological distress of hospital employees (HEs) during COVID-19 and often attributed it to the burden of work, the lack of personal protection equipment (PPE), or their situation having to make morally challenging decisions.[4,5] One multinational, multicenter study in Asia also reported a significant association between adverse psychological outcomes and physical symptoms displayed by healthcare workers.[6] Another study found that nonmedical health care personnel were at the highest risk for psychological distress during the COVID-19 outbreak.[7] The number of confirmed cases in Vietnam was still low so the system has yet experienced the overload of patients nor the serious lack of PPE. However, the COVID-19 pandemic together with the lockdown of one of the biggest hospitals in Vietnam can create mental catastrophe not only for HEs in the lockdown hospital but in the whole health care system due to stigma and self-isolation. For HEs in the lockdown hospital, they had to be in quarantine for 14 days inside the hospital and were vulnerable to both high risk of infection and mental health issues.[8] For

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HEs in other hospitals, although they did not undergo quarantine, they may still have psychological distress. Previous studies related to the 2003 SARS outbreak had reported negative psychological reactions such as self-isolation, stigmatization, or depression.[9,10] A pandemic may instill the fear of spreading the virus to family and community among HEs, thus, many have decided to isolate themselves, even within their own homes. Fear of contagion made people avoid places/people who can transmit the virus. The lockdown of 1 hospital, which was considered as the country's largest hotspot for COVID-19 at the study time may create stigma towards HEs due to their higher risk of transmission. Monitoring both the physical and mental health of HEs is crucial to maintain their wellbeing to cope with the enormous challenges of the COVID-19 pandemic. This study aims to examine the impact of undergoing a central quarantine due to the lockdown of Bach Mai hospital on the psychological disorders of HEs and identify associated factors with depression among HEs working in central hospitals of Hanoi, Vietnam. Understanding the negative psychological of COVID pandemic impacts on HEs is important in building resilience to such adverse events.

Methods

Study settings

This study employed a cross-sectional design. To compare the experiences of HEs in lockdown hospital with the experience of HEs in other hospitals, a sample of respondents were chosen from Bach Mai Hospital (ie, the lockdown hospital) and other central hospitals in Hanoi.

Study time: Bach Mai hospital was lockdown for 2 weeks since March 28, 2020. The study started collecting data 1 week after the lockdown of BM hospital ended (April 20th to May 1st)

Sample size and sampling method

To compare the psychological burden among HEs in lockdown hospital with other HEs, we used the formula to compare 2 proportions to estimate the sample size

$$n = \frac{\left\{ z_{1-\alpha/2}\sqrt{2\bar{P}(1-\bar{P})} + z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)} \right\}^2}{(P_1-P_2)^2}$$

In which $\alpha = 5$, $1-\beta = 80$, $p_1 = 0.4$[11] (based on previous studies about mental health issues among HEs in COVID-19) and $p_2 = 0.25$, the minimum sample size needed for 1 group was 120 HEs. We anticipated that the non-response rate may be high because we collected data online, so we invited 160 HEs in BM hospital and 250 HEs in 2 other central hospitals located in Hanoi. Eligible subjects were randomly selected among the list of HEs in the selected hospitals. The investigators contacted eligible subjects by telephone to explain the study in detail and administered a verbally informed consent process. If HEs agreed to participate, they would receive the online form to complete. The response rate among HEs in the lockdown hospital was 93.1% and among other hospitals was 89.6%. The total study sample size was 373 HEs from 3 hospitals, including 149 HEs from Bach Mai hospital and 224 HEs from the other 2 hospitals.

Data collection

The survey instrument was developed using the software platform KoBo Toolbox (https://www.kobotoolbox.org/). The electronic questionnaire's content and interface are designed and tested so that the audience can answer on media such as smartphones, tablets, and computers. The survey form included basic information about demographic factors, the experience of self-isolation, stigma related to COVID-19, and other psychological distress. After completing the survey, the files were converted into Stata readable electronic files.

Measurements

Independent variables. Demographic information: participant reported the following demographic information: age, gender.

Characteristics of job: We selected information about the type of hospital, the average number of patients per day, shortage of personal protective equipment (PPE). Type of hospital, a main independent variable, was categorized into 2 groups: lockdown (Bach Mai hospital) and un-lockdown (other national hospitals). Shortage of PPE was classified into 2 groups, Yes and No: We have asked the HEs "During last 3 months, have you ever needed any kind PPE for working but you haven't been supplied?." This indicates whether HEs are faced with a shortage of PPE. The average number of patients per day were grouped into 4 groups: less than 10 patients, 10 to 20 patients, 21 to 30 patients, and more than 30 patients per day.

Self-isolation: Information about self-isolation was collected by asking during the last 3 months, the respondents ever isolated themself from their family to reduce the risk of spreading COVID to their family members. This variable was categorized into 2 groups: Yes and No

Stigmatization by community: Stigmatization by community-associated with COVID-19 was measured by the modified HIV stigma index.[12] In the original tool, respondents were asked to identify incidents of stigma and discrimination from other people, with questions relating specifically to gossip, verbal insults, harassment, verbal and physical assault, and social exclusion as well as other forms of discrimination as decreased access to work, health care, education services. For this study, we modified this tool to check for 4 forms of experiences during the last 3 months among HEs: (1) Being verbally insulted that you have a higher risk of spreading the virus; (2) Being alienated by your neighbors/friends/community members; (3) being refused to rent your accommodation; and (4) your family members were treated differently by others

due to your working position. These 4 experiences were evaluated by the Likert scale (with 4 levels, never, rarely, sometimes, often). For the logistic regression models, we combined the 4 items above into "Perceived stigmatization by the community," this variable was categorized into 2 groups: Yes and No. If respondents answered "Sometimes" or "Often" in any of 4 items then he/she belongs to group "Yes: Perceived stigmatization from the community," otherwise he/she belongs to group "No: Have not perceived stigmatization from the community."

Study outcomes

The primary outcome of this study was the perceived mental health disorder. The Patient Health Questionnaire (PHQ) is a self-administered version of the PRIME-MD diagnostic instrument for common mental disorders. The PHQ-9 is the depression module, which scores each of the 9 DSM-IV criteria as "0" (not at all) to "3" (nearly every day). The total score of PHQ-9 was grouped into 5 categories: Minimal or none (0-4 points), mild (5-9 points), moderate (10-14 points), moderately severe (15-19 points); and severe (20-27 points).[13]

For the logistic regression models: Depression was defined as a PHQ-9 score equal to or greater than 10 points

Data analysis

We used STATA 14.0 for all data analyses. HEs demographic and job characteristics were summarized in total and stratified by study arm, and differences between the 2 groups were tested using t-tests for normally distributed continuous data, Kruskal Wallis tests for continuous data not normally distributed, and $\chi 2$ tests for categorical data.

To determine whether working in a lockdown hospital was associated with a higher level of depression among the participants, unadjusted logistics regression models were performed. Logistics multi-variable model was constructed which contained those variables significant in unadjusted analyses at the alpha = .05 level and were additionally adjusted for age and gender.

Ethical considerations

Ethical clearance, including confidentiality of the participants' consents and information, was approved by the Human Research Ethics Committee at Hanoi University of Public Health.

Results

Characteristics of the study population

We recruited 373 HEs from 3 hospitals, including 149 HEs (39.9%) from Bach Mai hospital (a lockdown hospital) and 224 HEs (60.1%) from un-lockdown hospitals. Overall, the mean (sd) HEs age was 34.5(7.4) years old; 47.7% HEs were male (Table 1). The number of HEs contacted about less than 10 patients, 11 to 20 patients, 21 to 30 patients and more than 30 patients per day made up 14.2%, 14.7%, 6.4%, and 12.1%, respectively. The prevalence of shortage of PPE was 22.5% (24.2% in lockdown hospital and 21.4% in un-lockdown ones).

Table 1. Characteristics of healthcare staff working in national hospitals in Viet Nam.

CHARACTERISTICS	TOTAL (N = 373)
General characteristics	
Age; mean (SD)	34.5 (7.4)
Male	178 (47.7)
Job characteristics	
Number of patients to contact directly per day	
Less than 10 patients	100 (26.8)
11-20 patients	126 (33.8)
21-30 patients	68 (18.2)
More than 30 patients	79 (21.2)
Experience of shortage of PPE	84 (22.5)

Self-isolation and stigmatization related to COVID-19

Among the study sample (Table 2), 61.1% of respondents from the lockdown hospital reported experience of self-isolation compared to 30.8% from other hospitals ($P < .001$). More noticeable, 15.4% of the respondent from the lockdown hospital had to choose self-isolation from family frequently.

The prevalence of experiencing stigmatization related to COVID-19 was also higher among respondents from the lockdown hospital compared to from other hospitals (60.4% vs 32.1%; $P < .001$).

Comparing the level of perceived depression between the lockdown hospital and other hospitals

The median (IQR-Interquartile range) PHQ-9 score across all HEs was 4 (IQR: 1-7) out of a maximum score of 27 (Table 3). HEs working in the lockdown hospital had a median score that was higher than that of HEs in un-lockdown hospitals ($P < .001$-Kruskal Wallis test). The overall percentage of perceived depression (10 points and above) among all HEs was 12.1%. This figure was higher among HEs in the lockdown hospital compared to HEs in other hospitals (20.1% vs 6.7%; $P < .001$).

Multivariate model to examine associated risk factors for depression among the study sample

Table 4 shows the bivariate and multivariate logistics models for depression among HEs. In the crude models (ie, bivariate analysis) 4 variables showed significant association with the outcome. Those were working in lockdown hospital, the

Table 2. Experience of self-isolation and stigmatization associated with COVID-19 among healthcare staff by hospitals.

STIGMA AND SELF-ISOLATION	BACH MAI	OTHER HOSPITALS	TOTAL (N = 373)	*P*
Self-isolation with family				
Never	58 (38.9)	155 (69.2)	213 (57.1)	<.001
1 time	27 (18.1)	26 (11.6)	53 (14.2)	
Sometimes	41 (27.5)	23 (10.3)	64 (17.2)	
Often	23 (15.4)	20 (8.9)	43 (11.5)	
Stigmatization associated with COVID-19				
Being verbally insulted that you have a higher risk of spreading the virus				
Never	76 (51.0)	177 (79.0)	253(67.8)	<.001
1 time	14 (9.4)	3 (1.3)	17 (4.6)	
Sometimes	52 (34.9)	38 (17.0)	90 (24.1)	
Often	7 (4.7)	6 (2.7)	13 (3.5)	
Being refused to rent your accommodation				
Never	130 (87.2)	216 (96.4)	346 (92.8)	<.01
1 time	13 (8.7)	4 (1.8)	17 (4.6)	
Sometimes	4 (2.7)	3 (1.3)	7 (1.9)	
Often	2 (1.3)	1 (0.4)	3 (0.8)	
Being alienated by your neighbors/friends/community members				
Never	62 (41.6)	169 (75.4)	231 (61.9)	<.001
1 time	26 (17.4)	9 (4.0)	35 (9.4)	
Sometimes	54 (36.2)	40 (17.9)	94 (25.2)	
Often	7 (4.7)	6 (2.7)	13 (3.5)	
Your family members were treated differently by others due to your working position				
Never	56 (37.6)	188 (83.9)	244 (65.4)	<.001
1 time	24 (16.1)	9 (4.0)	33 (8.8)	
Sometimes	55 (36.9)	20 (8.9)	75 (20.1)	
Often	14 (9.4)	7 (3.1)	21 (5.6)	
Stigmatization	90 (60.4)	72 (32.1)	162 (43.43)	<.001

Table 3. Level of perceived depression among healthcare staff by hospitals.

PH-Q9 SCORE		BACH MAI	OTHER HOSPITALS	TOTAL (N = 373)	*P*
PH-Q9 SCORE; MEDIAN (IQR)		5 (2; 9)	3 (0; 5)	4 (1; 7)	<.001
Depression severity base on PH-Q9 score					
0-4	Minimal or none	61 (40.9)	148 (66.1)	209 (56.0)	<.001
5-9	Mild	58 (38.9)	61 (27.2)	119 (31.9)	
10-14	Moderate	20 (13.4)	5 (2.2)	25 (6.7)	
15-19	Moderately severe	8 (5.4)	6 (2.7)	14 (3.7)	
20-27	Severe	2 (1.3)	4 (1.8)	6 (1.6)	
Depression		30 (20.1)	15 (6.7)	45 (12.1)	<.001

Table 4. Univariate and multivariate logistics regression analysis of characteristics associated with depression of 373 healthcare staff among COVID-19 pandemic, Viet Nam 2020.

CHARACTERISTICS	PERCEIVED DEPRESSION	UNIVARIATE ANALYSIS			MULTIVARIATE ANALYSIS		
	N (%)	OR	CI95% OR	*P*-VALUE	OR*	CI95% OR*	*P*-VALUE
Age in years		1.02	0.98; 1.06	.32	1.01	0.96; 1.05	.75
Gender							
Male	17 (9.55)	Ref			Ref		
Female	28 (14.36)	1.59	0.84; 3.01	.16	1.09	0.53; 2.27	.81
Working in lockdown hospital							
No	15 (6.7)	Ref			Ref		
Yes	30 (20.13)	3.57	1.82; 6.67	<.001	2.38	1.11; 5.26	.03
Number of patients to contact directly per day							
Less than 10 patients	7 (7.0)	Ref			Ref		
11-20 patients	11 (8.83)	1.3	0.47; 3.41	.63	1.26	0.46; 3.47	.66
21-30 patients	12 (17.65)	2.9	1.06; 7.66	.04	3.19	1.14; 8.96	.03
More than 30 patients	15 (18.99)	3.1	1.20; 8.07	.02	2.64	0.98; 7.11	.05
Shortage of PPE							
Yes	13 (15.48)	Ref			Ref		
No	32 (11.07)	0.68	0.34; 1.36	.28	0.82	0.39; 1.73	.60
Self-isolation associated with COVID-19							
No	25 (9.4)	Ref			Ref		
Yes	20 (18.69)	2.22	1.17; 4.19	.01	1.35	0.66; 2.75	.60
Stigmatization associated with COVID							
No	13 (6.16)	Ref			Ref		
Yes	32 (19.75)	3.75	1.90; 7.41	.00	2.63	1.25; 5.52	.01

*Denoted for adjusted ORs.

number of patients to contact directly per day, self-isolation, and stigmatization related to COVID-19. In the adjusted model, when controlling for other variables, the association between self-isolation and depression became non-significant. Only 3 variables showed a statistically significant association with the outcome. Specifically, HEs working in the lockdown hospital had a higher risk of reporting depression compared to those working in other hospitals (OR: 2.38; *P* = .03; 95% CI: 1.1-5.26). HEs who contact directly about 21 to 20 patients per day had 3.19-times higher odds of being perceived depression than HEs who contact less than 10 patients. HEs who being stigmatized associated with COVID-19 had 2.63 times higher odds of perceived depression than others (OR: 2.63; *P* = .01; 95% CI: 1.25; 5.52).

Discussion

This study aimed to evaluate the psychological burden among HEs in Hanoi during the early stage of the COVID pandemic as well as to examine the impact of quarantine in the lockdown hospital on their HEs. Using PH-Q9, a validated screening tool for depression,[13] this study reported a 12.1% of HEs with depression. Previous studies that applied the same PH-Q9 in other Asian countries showed a prevalence of depression ranged from 0.56% to 6.7%.[14,15] The prevalence of depression examined by PH-Q9 among HEs was 11.4%.[16] One study in China using the same tool PH-Q9 showed that the prevalence of reported depression disorder among hospital employees during the COVID-19 pandemic can be extremely high (ie, 50.4%).[11] This study demonstrated that although the number of COVID-19 in Vietnam remained low, HEs were still facing many psychological issues including self-isolation, stigmatization related to COVID-19, and depression. Previous studies had reported the negative impacts of an epidemic of infectious diseases on HEs and attributed these impacts to a feeling of vulnerability, loss of control, fear of spreading the virus to family and community, being isolated, high burden of work.[5,17-19]

This study also presented some critical challenges HEs were facing due to COVID-19 such as self-isolation or stigmatization related to COVID-19. Of 373 HEs, nearly half of them ever had to decide to self-isolate to avoid the possibility of infecting their family with the virus. This figure raised the alarm because the support from family is extremely crucial for both the physical and mental well-being of HEs. Stigma was defined as "the co-occurrence of labeling, stereotyping, separation, status loss, and discrimination in a context in which power is exercised".[20] In this study, stigmatization related to COVID-19 was examined through 4 types of experiences: being verbally insulted, being alienated, being refused to rent your accommodation, and having a family member being treated differently. This study showed that HEs in Hanoi were experiencing some forms of stigma related to COVID-19 and it can make an already challenging situation far more difficult. More notable, the HEs in the lockdown hospital reported higher proportions for all types of experiences related to COVID-19 stigma compared to HEs in other hospitals (60.4% vs 32.1%). Results were consistent with previous studies showing that HEs quarantined were more likely to report stigmatization and rejection from community, friends and even family compared to those not quarantined.[9,21,22] For instance, respondents reported that they experienced being alienated, withdrawing social invitation, treat them with fear, or making critical comments.[21,23] Their family also considered their job as risky after being quarantined.[24]

Finally, a major finding of the present study were 3 significant factors associated with depression among HEs. The first variable was working in the lockdown hospital. The proportion of HEs with depression was 20.1% among the lockdown hospital, significantly higher compared to that among other hospitals in Hanoi (ie, 6.7%). The adjusted odds ratio for the association between working in lockdown hospital and depression was 2.38, confirming the significant association between this variable and study outcome after controlling for other variables. Working in the lockdown hospital meant that HEs had to undergo 14 days of quarantine so this association may be explained by the negative impact of quarantine on health care worker's mental health.[8] Specifically, during and right after the quarantine, health care workers were more likely to report issues such as exhaustion, insomnia, anxiety, poor concentration, detachment from others, or consideration of resignation.[9] Other studies even reported the long-term effect of being quarantined such as post-traumatic stress symptoms, alcohol abuse, or dependency symptoms among health care workers.[11,25] Number of directly contacted patients per day was the second significant variable, the higher number of directly contacted patients per day, the higher risk of reporting depression. During the COVID-19 pandemic, a higher volume of patients also meant a higher possibility of transmitting virus.[11] Studies had reported that frequent interaction with patients may increase the level of stress among health care workers because it fosters emotions of fear, desperation, and incapacity to address patients' problems.[26] Stigmatization related to COVID-19 was also a risk factor for depression as HEs reported experiencing stigma related to COVID-19 also had a higher risk of depression. As previous research suggested, this finding emphasized the importance of intervention such as social media platforms, workshops that provided a way to deal with the stigma associated with being a health care worker during pandemic time.[27] Previous studies also suggested that internet cognitive behavioral therapy may work as an effective intervention.[28]

This study applied a cross-sectional study which was administered among HEs employers in central hospitals of Hanoi; thus, the study results may not be generated to all types of hospitals in Hanoi and Vietnam due to the differences in working environment/services provision/volume of clients between central big hospitals with other hospitals. Besides, with a cross-sectional design, the study was not able to present the changes in psychological status of HEs before/after the lockdown, only able to provide a snapshot of the association between the number of directly contacted patients per day, stigmatization related to COVID-19, being in lockdown hospital with depression. Future studies with a more concrete design will be needed to confirm these relationships.

Conclusion

The wellbeing and emotional resilience of healthcare workers are key components of maintaining essential healthcare services during the COVID-19 pandemic. The study confirmed the high burden of psychological issues that HEs were facing in Hanoi, the significant negative impact of central quarantine in a lockdown hospital on the mental health of HEs as identified significant related factors to depression among HEs in central hospitals of Hanoi, Vietnam. In the future, if similar situations like lockdown hospital ever happened, interventions to support HEs undergoing central quarantine are crucial. Reducing these associated factors to depression identifying in this study may help to reduce the psychological burden HEs have to cope with during the pandemic.

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Author Contributions (Roles)

All authors made substantial contributions to the study, revised the manuscript, and approved the final version for publication.

Ethics Approval and Consent to Participate

All procedures performed in the study involving human participants were in accordance with the ethical standards of The Ethical Review Board for Biomedical Research Hanoi University of Public Health. All information on the original dataset was collected confidentially.

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REFERENCES

1. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. *Lancet*. 2020;395:470-473.
2. COVID-19 Dashboard. Accessed May 1, 2020. https://ncov.vncdc.gov.vn/
3. Tran BX, Hoang MT, Pham HQ, et al. The operational readiness capacities of the grassroots health system in responses to epidemics: implications for COVID-19 control in Vietnam. *J Glob Health*. 2020;10:011006.
4. Kang L, Li Y, Hu S, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. 2020;7:e14.
5. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*. 2020;368:m1211.
6. Chew NWS, Lee GKH, Tan BYQ, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun*. 2020;88:559-565.
7. Tan BYQ, Chew NWS, Lee GKH, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med*. 2020;173:317-320.
8. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*. 2020;395:912-920.
9. Bai Y, Lin C-C, Lin C-Y, Chen J-Y, Chue C-M, Chou P. Survey of stress reactions among health care workers involved with the SARS outbreak. *Psychiatr Serv*. 2004;55:1055-1057.
10. Maunder R, Hunter J, Vincent L, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ*. 2003;168:1245-1251.
11. Wu P, Fang Y, Guan Z, et al. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry*. 2009;54:302-311.
12. The People Living with HIV Stigma Index. An index to measure the stigma and discrimination experienced by people living with HIV. Accessed September 8, 2020. http://www.stigmaindex.org/
13. Zhang Y-L, Liang W, Chen Z-M, et al. Validity and reliability of Patient Health Questionnaire-9 and Patient Health Questionnaire-2 to screen for depression among college students in China. *Asia Pac Psychiatry*. 2013;5:268-275.
14. Lu S, Reavley N, Zhou J, et al. Depression among the general adult population in Jiangsu Province of China: prevalence, associated factors and impacts. *Soc Psychiatry Psychiatr Epidemiol*. 2018;53:1051-1061.
15. Shin C, Kim Y, Park S, et al. Prevalence and associated factors of depression in general population of Korea: results from the Korea National Health and Nutrition Examination Survey, 2014. *J Korean Med Sci*. 2017;32:1861-1869.
16. Al-Ghafri G, Al-Sinawi H, Al-Muniri A, et al. Prevalence of depressive symptoms as elicited by Patient Health Questionnaire (PHQ-9) among medical trainees in Oman. *Asian J Psychiatr*. 2014;8:59-62.
17. Sood S. Psychological effects of the Coronavirus disease-2019 pandemic. *Res Humanit Med Educ*. 2020;7:23-26.
18. Wong TW, Yau JKY, Chan CLW, et al. The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *Eur J Emerg Med*. 2005;12:13-18.
19. Chen N-H, Wang P-C, Hsieh M-J, et al. Impact of severe acute respiratory syndrome care on the general health status of healthcare workers in Taiwan. *Infect Control Hosp Epidemiol*. 2007;28:75-79.
20. Link BG, Phelan JC. Conceptualizing stigma. *Annu Rev Sociol*. 2001;27:363-385.
21. DiGiovanni C, Conley J, Chiu D, Zaborski J. Factors influencing compliance with quarantine in Toronto during the 2003 SARS outbreak. *Biosecur Bioterror*. 2004;2:265-272.
22. Wester M, Giesecke J. Ebola and healthcare worker stigma. *Scand J Public Health*. 2019;47:99-104.
23. Reynolds DL, Garay JR, Deamond SL, Moran MK, Gold W, Styra R. Understanding, compliance and psychological impact of the SARS quarantine experience. *Epidemiol Infect*. 2008;136:997-1007.
24. Desclaux A, Badji D, Ndione AG, Sow K. Accepted monitoring or endured quarantine? Ebola contacts' perceptions in Senegal. *Soc Sci Med*. 2017;178:38-45.
25. Wu P, Liu X, Fang Y, et al. Alcohol abuse/dependence symptoms among hospital employees exposed to a SARS outbreak. *Alcohol Alcohol*. 2008;43:706-712.
26. Boumans NP, Landeweerd JA. A Dutch study of the effects of primary nursing on job characteristics and organizational processes. *J Adv Nurs*. 1996;24:16-23.
27. Raven J, Wurie H, Witter S. Health workers' experiences of coping with the Ebola epidemic in Sierra Leone's health system: a qualitative study. *BMC Health Serv Res*. 2018;18:251.
28. Zhang MWB, Ho RCM. Moodle: the cost effective solution for internet cognitive behavioral therapy (I-CBT) interventions. *Technol Health Care*. 2017;25:163-165.