RESEARCH ARTICLE

Mental wellbeing of healthcare workers working in quarantine centers during the COVID-19 pandemic in Qatar

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ABSTRACT

Background: Healthcare workers managing Coronavirus 19 (COVID-19) patients are at increased risk of poor mental wellbeing. The available literature on the psychological impact in the Arabian Gulf region is limited, and a more in-depth analysis of factors affecting frontline healthcare workers' mental wellbeing is warranted. The aim of this study was to evaluate and explore healthcare workers' wellbeing working in quarantine centers in Qatar.

Methods: This study was a cross-sectional, web-based survey conducted on healthcare workers managing patients in designated quarantine centers. Healthcare workers associated with 51 COVID-19 quarantine centers were eligible to participate in this survey from April 19 to May 3, 2020. The primary outcome of interest was mental wellbeing as measured by the Warwick-Edinburgh Mental Well-Being Scale (WEMWBS).

Results: A total of 127 of 169 contacted staff members completed the survey, with a participation rate of 75%. Approximately 17.4% of participants had well-being scores of less than 45, indicating suboptimal wellbeing and a high risk of psychological distress and depression. The multivariable logistic regression analysis showed that nurses are associated with increased risk (more than the fivefold higher risk of having WEMWBS score < 45) of adverse mental wellbeing (adjusted OR 5.65; 95% CI 0.57, 56.4; $p = 0.140$).

Conclusion: The psychological impact of working in quarantine centers on healthcare workers was less than what has been reported globally. Nurses are the

most vulnerable group. It is essential that health services monitor the psychological impact on its workforce and puts appropriate mitigation strategies in place.

Keywords: COVID-19, Quarantine, Mental Wellbeing, Healthcare Workers

INTRODUCTION

Quarantine and isolation measures are recommended by the World Health Organization to limit the spread of infectious epidemics as part of a comprehensive public health response package. It involves restricting movement and separating individuals from the rest of the population to monitor symptoms and prevent spread.[1] The psychological impact of lockdown and quarantine on communities is wide-ranging. This effect includes fear of falling sick or dying, feelings of helplessness, increased levels of self-blame, depression, and anxiety.[2]

Infectious epidemics are known to have a significant impact on healthcare workers. They are at high risk of physical and psychological harm. Anxiety and depressive symptoms have been reported in health-care workers during the severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome outbreaks.[3-6] The emerging evidence from coronavirus disease 19 (COVID-19) is no different.[7] The psychological impact of COVID-19 on healthcare workers has been reported in many countries. The studies report a wide range of symptoms that include fear, anxiety, depression, insomnia, burnout, trauma symptoms, emotional exhaustion, and somatic symptoms. A systematic review and meta-analysis on the prevalence of depression, anxiety, and insomnia during the COVID-19 pandemic by Pappa et al.[8] indicates a prevalence of anxiety in 23.2%, depression in 22.8%, and insomnia in 38.9% of healthcare workers. This analysis mainly includes studies from China, where the illness was first reported and subsequently spread across the globe. The studies from Italy[9] and Iran[10] report an impact on 43% and 59% of healthcare workers, respectively. In the Arabian Gulf region, there are no studies exclusively focusing on healthcare workers. A study from the Kingdom of Saudi Arabia[11] reports that 40% of the population has psychological distress and healthcare workers are more vulnerable than others. The study from Oman[12] only focuses on physicians and reports that young female physicians on the frontlines are

more vulnerable to psychological distress. The available literature on the psychological impact in the Arabian Gulf region is limited. A more in-depth analysis of factors affecting the mental wellbeing of frontline healthcare workers is warranted.

The aim of this observational study is to explore the psychological impact on healthcare workers working in quarantine centers in the State of Qatar. It is important to note that healthcare workers in quarantine centers are on the frontlines and at a substantially increased risk of becoming infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In addition to managing physical health, healthcare workers in quarantine facilities are at the forefront of containing the stress and anxieties of quarantined individuals and their families. This is a challenging task for healthcare teams.[13] However, healthcare workers in quarantine centers have to deal with nonacute presentations and have less direct contact with patients. The use of virtual consultations in quarantine centers is more prevalent than in hospital settings. To our knowledge, there have been no studies evaluating mental health outcomes of healthcare workers working in quarantine sites. The findings generated from this research study can have a substantial impact on formulating effective healthcare strategies.

METHODS

Design, Settings, and Participants

This study was a multi-center, cross-sectional, exploratory web-based survey conducted in Qatar's COVID-19 designated quarantine centers. Approval from the Institutional Review Board of the Hamad Medical Corporation was received before the initiation of this study. This study followed the STROBE reporting guideline. Healthcare workers associated with 51 COVID-19 quarantine centers were eligible to participate in this survey. A total of 169 healthcare workers were invited to complete the survey. Participants were provided an overview of the research, and their participation in the survey was deemed informed consent. The survey was anon-ymous. As the study design was exploratory, we did not set and formulate any prior statistical hypothesis and, therefore, we did not perform any formal sample size calculation.

Main Outcomes and Measures

The primary outcome of interest in the study was mental wellbeing as measured by the Warwick-

Edinburgh Mental Well-Being Scale (WEMWBS).[14] The WEMWBS scale is designed to be self-completed. The final scale consists of 14 items covering both hedonic and eudaimonic aspects of mental health, including positive affect (I have been feeling optimistic about the future; I have been feeling useful; I have been feeling relaxed; I have been feeling interested in other people; I have had energy to spare; I have been dealing with problems well; I have been thinking clearly; I have been feeling good about myself; I have been feeling close to other people; I have been feeling confident; I have been able to make up my mind about things; I have been feeling loved; I have been interested in new things; I have been feeling cheerful).

Individuals completing the scale were required to tick the box that best describes their experience of each statement over the past two weeks using a five-point Likert scale (none of the time, rarely, some of the time, often, all of the time). The total score was obtained by summing the score for each of the 14 items. For each item, the score ranges from 1 to 5, and the total score was from 14 to 70. Partially completed responses were excluded from the analysis. The overall score for the WEMWBS was calculated by totaling the scores for each item, with equal weights. A higher WEMWBS score, therefore, indicated a higher level of mental wellbeing.

WEMWBS reflected the groups' mental wellbeing. Individual scores were tallied to determine an average score for a group. A categorical approach was used, and scores were divided into high, average, and low mental wellbeing using cut points corresponding to the cut points on validated scales of mental illness, such as the Center for Epidemiologic Studies Depression Scale (CES-D) measure of depression.[15] A score of 40 and below corresponded to probable depression and a score of 41–44 to possible depression.

Demographic data were self-reported by participants, including age, gender, ethnicity, occupation, and living arrangement.

Statistical Analysis

Data analyses were performed using statistical packages SPSS 26.0 (SPSS Inc. Chicago, IL) and Epi-info (Centers for Disease Control and Prevention, Atlanta, GA) software. The significance level was set at $\alpha < 0.05$, and all tests were two-tailed. We used descriptive statistics to summarize and determine the sample characteristics and the distribution of participant data. The mean and standard deviation were used to report normally distributed data and results; the median and inter-quartile range were used to communicate the results for skewed data. The frequencies and proportions were used to report the categorical data. We used the Chi-square ($\chi2$) test or Fisher's exact test to examine the associations between two or more qualitative data variables. We used the unpaired t or Mann–Whitney U test to analyze quantitative data between the two independent groups (WEMWBS scores < 45 and scores ≥ 45). A one-way analysis of variance (ANOVA) or nonparametric Kruskal–Wallis tests was used for analyzing quantitative data between more than two independent groups.

Associations of participants' potential risk factors (such as age, gender, ethnicities, professions, and living with family status) were determined using the occurrence of lower score cut-off values (WEMWBS score < 45 score) that inversely affect mental health outcomes. For this determination, we used univariate and multivariate logistic regression analysis (controlling and adjusting for potential predictors and confounders). An odds ratio (OR) with corresponding 95% confidence intervals (CI) was used to communicate the results of logistic regression. A receiver operating characteristic (ROC) curve was calculated using significant predictors as determined via multivariate regression to assess the model's discrimination and predictive accuracy.

RESULTS

A total of 127 of 169 staff members who were contacted completed the survey, with a participation rate of 75%. However, 115 of 127 participants completed all 14 points of the WEMWBS and were included in the analysis. Twelve participants partially completed the WEMWBS and were excluded from the analysis.

Demographic Characteristics

A total of 48 (41.7%) participants were male. Of all participants, 86 (74.8%) were younger than 35 years old, 11.3% were aged 35 to 44, and 7.8% were aged 45 to 65. The participants included 110 (95.7%) physicians and 5 (4.3%) nurses. The participants were from diverse ethnic backgrounds, with the majority being Arab non-Qatari 57 (49.6%) and African 25 (21.7%). Demographic data are shown in Table 1.

Table 1. Participant Characteristics

Characteristics	Frequency	Percentage (%)
Age group (years)		
18 – 24	7	6.1
25 – 34	86	74.8
35 – 44	13	11.3
45 – 54	5	4.3
55 – 65	4	3.5
Gender		
Male	48	41.7
Female	67	58.3
Ethnicity		
Arab-Qatari	1	0.9
Arab- Other	57	49.6
Indian	10	8.7
Pakistani	9	7.8
Philippines	4	3.5
African	25	21.7
Others	8	7.0
Unknown	1	0.9
Profession		
Doctor	110	95.7
Nurse	5	4.3
Living status		
Married & living with family	50	43.5
Married & living alone	7	6.1
Single living alone	4	3.5
Single & living in shared accommodation	28	24.3
Others	26	22.6

Scores of Measurements and Associated Factors

Approximately 20/115 (17.4%, 95% CI 11.6, 25.3%) of the participants had well-being scores of less than 45, indicating suboptimal wellbeing, and a high risk of psychological distress and depression. Out of these, 5 (4.3%) had well-being scores of less than 40, indicating a high risk of major depression (Figure 1). The prevalence of well-being scores of less than 45 and their association with participants' characteristics are shown in Table 2. The Chi-square statistical analysis showed that professional nurses (60%) had significantly higher percentages of well-being scores that were less than 45 and inversely associated with well-being outcomes compared with those of doctors (15.5%); $p = 0.036$. However, the number of nurse

participants seemed much smaller in number, which might limit the generalizability of this finding and its statistical significance.

Participants in the age group less than 35 years, females, not living with family, ethnicity other than Arab and South Asian all had higher percentages of well-being scores that were less than 45 and inversely associated with well-being outcomes; however, these differences were statistically insignificant ($p > 0.05$). A similar trend was found among the female gender, non-Arab ethnicity, the nursing profession, and those not living with family. All had a lower mean WEMWBS score compared with their respective groups. However, most of these differences were statistically insignificant when we compared actual mean WEMWBS scores across various participant characteristics (Table 2). Figure 2 is a box plot depicting the distribution of WEMWBS scores across participant characteristics.

Risk Factors of Mental Well-Being Outcomes

The results of univariate and multivariate logistic regression analysis testing for each predictor and their possible association with low WEMWBS scores (score cut-off value < 45) are presented in Table 3. Participants having the professional nurse title were at an eightfold higher risk of well-being scores of less than 45 that were inversely associated with suboptimal well-being outcomes compared with doctors (unadjusted OR 8.21; 95% CI 1.27, 52.84; $p = 0.027$). However, the number of nurse participants seemed much smaller, which might limit the generalizability of this finding and its statistical significance. Compared with participants in the younger age group (age less than 35 years), those in the age group older than 35 years had a decreased risk that was positively associated with mental well-being outcomes (unadjusted OR 0.71; 95% CI 0.19, 2.66; $p = 0.607$). Female gender (unadjusted OR 1.85; 95% CI 0.66, 5.22; $p = 0.246$), ethnicity other than Arab and South Asian (unadjusted OR 2.16; 95% CI 0.71, 6.59; $p = 0.177$), and participants not living with family (unadjusted OR 2.17; 95% CI 0.82, 5.76; $p = 0.121$) were inversely associated (higher risk of WEMWBS score < 45) with well-being outcomes; however, these differences were statistically insignificant ($p > 0.05$).

The multivariable logistic regression analysis showed that participants who had the professional nurse title remained significantly associated with increased risk

Table 2. Associations between WEMWBS scores and participant characteristics

Participant Characteristics	WEMWBS Score < 45 (n = 20)	WEMWBS Score ≥ 45 (n = 95)	p Value*	WEMWBS Score (mean ± SD)	WEMWBS Score Median (range)	p Value**
Age group						
Age < 35 years	17 (18.3%)	76 (81.7%)	0.605	53.11 ± 7.88	54 (34 – 70)	0.953
Age > 35 years	3 (13.6%)	19 (86.4%)		53.0 ± 7.02	54 (37 – 65)	
Gender						
Male	6 (12.5%)	42 (87.5%)	0.241	53.67 ± 7.53	55 (34 – 70)	0.497
Female	14 (20.9%)	53 (79.1%)		52.68 ± 7.84	54 (37 – 68)	
Ethnicity						
Arab	7 (12.1%)	51 (87.9%)	0.380	53.86 ± 7.30	54 (40 – 70)	0.665
South Asian	4 (19%)	17 (81%)		52.62 ± 7.72	54 (37 – 65)	
Others	8 (22.9%)	27 (77.1%)		52.54 ± 8.07	55 (34 – 64)	
Profession						
Doctor	17 (15.5%)	93 (84.5%)	0.036	53.31 ± 7.50	54 (34 – 70)	0.147
Nurse	3 (60%)	2 (40%)		48.20 ± 11.17	43 (38 – 65)	
Living status						
Living with family	10 (13.3%)	65 (86.7%)	0.116	53.85 ± 7.33	55 (34 – 70)	0.144
Not living with family	10 (25%)	30 (75%)		51.65 ± 8.24	54 (37 – 69)	

WEMWBS: Warwick-Edinburgh Mental Well-Being Scale
*p value computes using Pearson Chi-Square statistical test
**p value computes using unpaired t test (for two independent groups) and one-way analysis of variance (ANOVA) statistical test method (for more than two independent groups).

(more than the fivefold higher risk of having WEMWBS score < 45) of adverse mental wellbeing (adjusted OR 5.65; 95% CI 0.57, 56.4; $p = 0.140$) after controlling and adjusting for all other potential confounders and predictors shown in Table 3. Finally, we computed a prediction model to evaluate the discriminative ability of potentially significant variables with statistical $p < 0.10$ on the occurrence of lower score cut-off values (WEMWBS score < 45) that adversely affect mental wellbeing. Multivariate
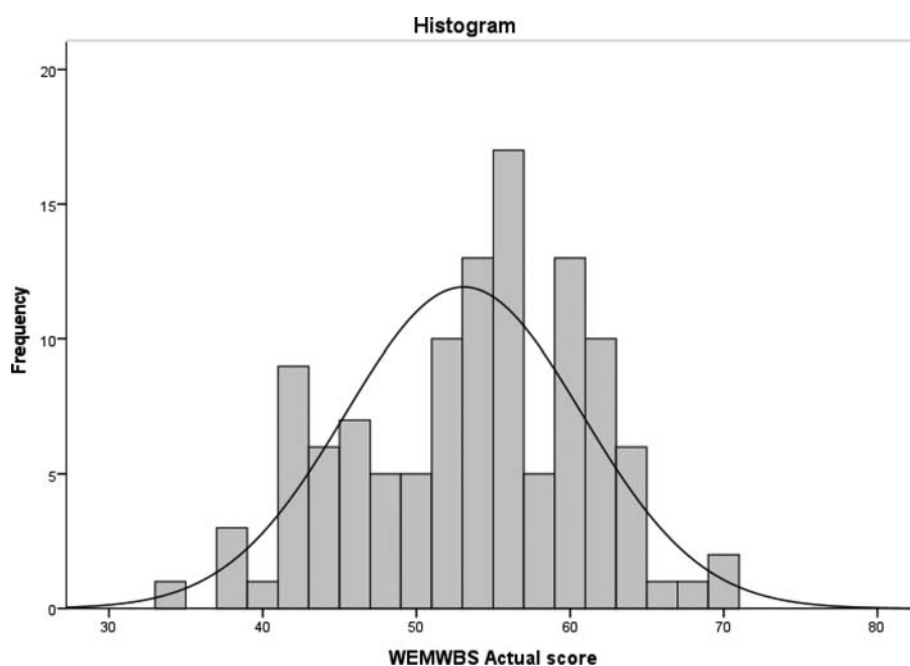

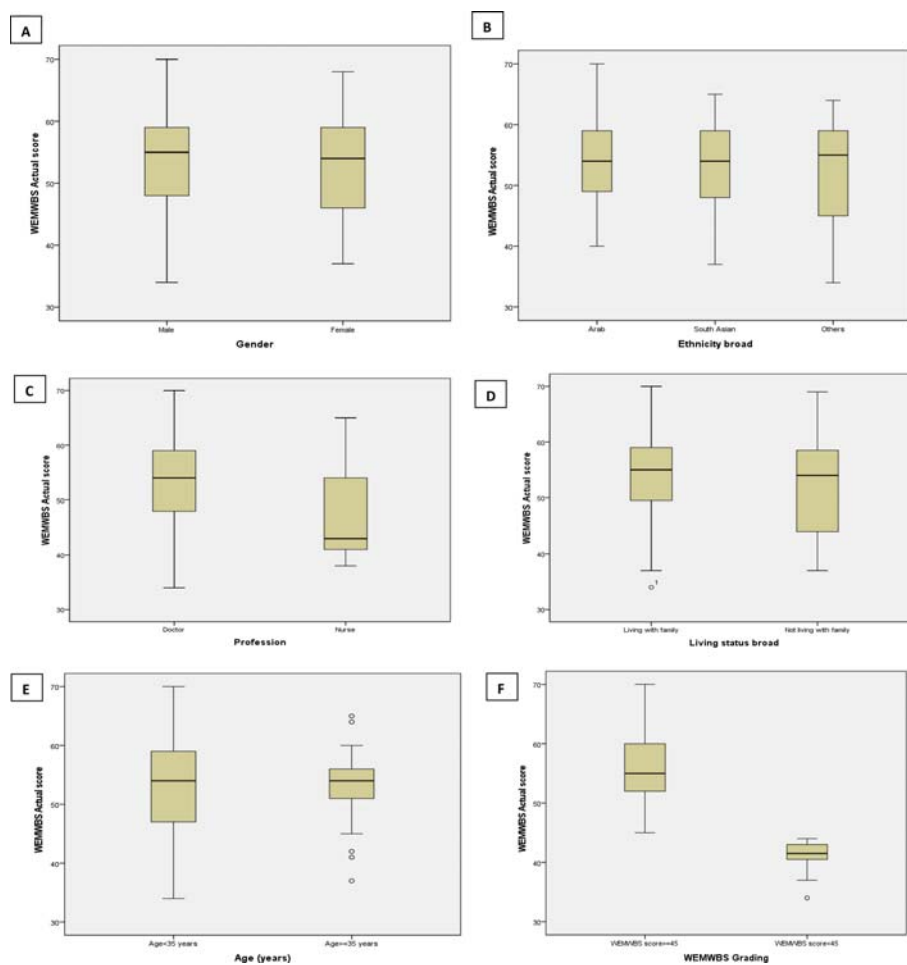Figure 1. Histogram depicting the distribution of WEMWBS scores.

Figure 2. Box plots depicting the distribution of WEMWBS scores across various participant characteristics.

logistic regression indicated that the final model demonstrated a modest fit (area under the curve (AUC) = 0.698, 95% CI 0.57, 0.82) (Figure 3 ROC curve) and included the potential predictors and risk factors as shown in Table 3.

DISCUSSION

The State of Qatar launched a national quarantine public health strategy resulting in the commissioning of 51 national quarantine sites across the country. These sites were used to quarantine people (both Qatari and nonQatari) with exposure or suspected exposure to COVID-19 positive cases.[16] During the study period, individuals who tested positive for the SARS CoV2 infection were nursed in hospital isolation facilities. Individuals were transferred to state-run quarantine facilities once they tested negative, where they remained until they tested negative a second time. The Ministry of Public Health in Qatar created a task force to manage quarantine sites. Our study is

the first in the region to highlight the psychological impact on healthcare workers working in quarantine centers.

In our study, approximately 17% of healthcare workers had well-being scores less than 45 on the WEMWBS, indicating suboptimal wellbeing. This result is better than that reported for healthcare workers in other countries. The prevalence and severity of the impact on mental health vary across countries and settings, and such variance has been associated with factors related to human resources, material resources, and individual factors.[17] The vulnerability of healthcare workers is attributed to increased fear of being infected, fear of infecting family, material resources available for protection, vicarious trauma, and ethical dilemmas. The resilience of healthcare workers is compromised by social isolation, stigma, and loss of social support. In quarantine centers, the lower prevalence of distress could be attributed to nonacute presentations, less direct contact with

Table 3. Logistic regression analysis to determine potential predictors and risk factors associated with low WEMWBS scores

	Univariate Logistic Regression			Multivariate Logistic Regression		
Participant characteristics	Unadjusted Odds Ratio (OR)	95% CI for OR	*p* Value	Adjusted OR*	95% CI for OR	*p* Value
Age group						
Age < 35 years	1.0 (Reference)					
Age > = 35 years	0.71	0.19, 2.66	0.607	0.39	0.06, 2.41	0.312
Gender						
Male	1.0 (Reference)					
Female	1.85	0.66, 5.22	0.246	1.47	0.45, 4.81	0.521
Ethnicity						
Arab	1.0 (Reference)					
South Asian	1.71	0.45, 6.58	0.432	1.81	0.45, 7.31	0.407
Others	2.16	0.71, 6.59	0.177	1.68	0.49, 5.78	0.409
Profession						
Doctor	1.0 (Reference)					
Nurse	8.21	1.27, 52.84	0.027	5.65	0.57, 56.4	0.140
Living status						
Living with family	1.0 (Reference)					
Not living with family	2.17	0.82, 5.76	0.121	2.06	0.66, 6.46	0.216

WEMWBS: Warwick-Edinburgh Mental Well-Being Scale
*Adjusted for predictors: age, gender, ethnicity, profession, and living status.
In dichotomous outcome variable: WEMWBS scores $\geq$ 45 was considered as the reference group.
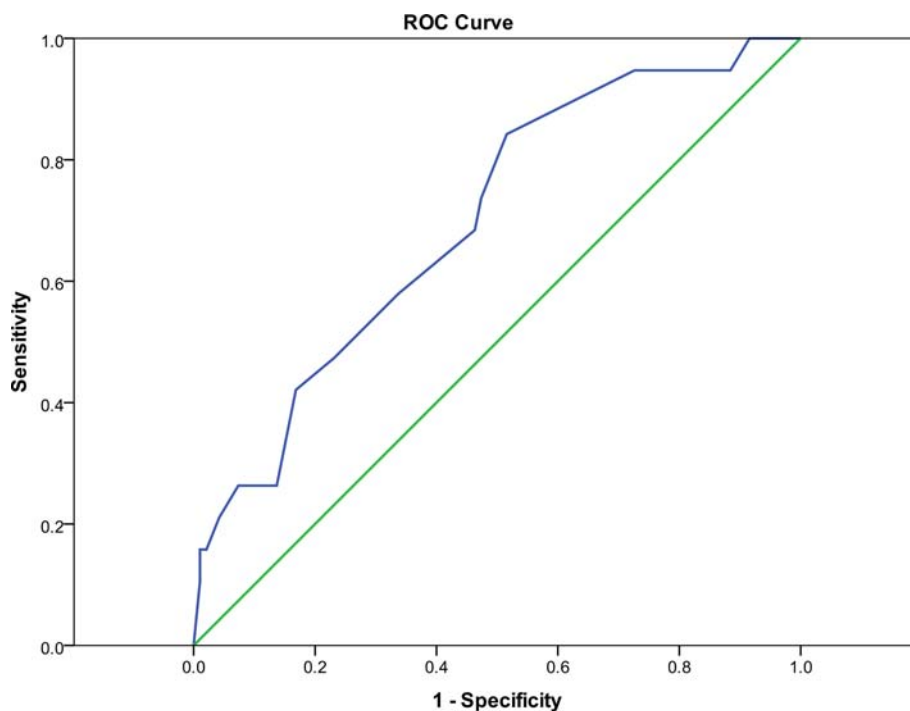
Figure 3. Receiver operating characteristic curve (ROC) to evaluate and assess the predictive accuracy of the developed logistic regression model (using the predicted probabilities).

patients, fewer ethical dilemmas, and the use of virtual consultations.

Our results indicate that healthcare workers in the younger age group (younger than 35 years), females, nurses, ethnicity other than Arab and South Asian, and participants 'not living with family' were associated with poorer outcomes. However, most of these differences were statistically insignificant. The multi-variable logistic regression analysis showed that participants with the professional nurse title remained significantly associated with increased risk (more than fivefold) of adverse mental wellbeing after controlling and adjusting for all other potential confounders and predictors. This can be attributed to more direct care provided by nurses. The increased risk of adverse psychological outcomes among nurses has been documented in earlier studies.[5,6,18]

The strength of the present study includes a reasonable response rate. The limitations include a low response rate from nurses and arbitrary cut points. However, we used a categorical approach with WEMWBS, which corresponds to the cut points on validated scales of mental illness, such as the Center for Epidemiologic Studies Depression Scale. The statistical analysis performed in this study was exploratory and derived inferences cannot be generalized.

CONCLUSION

The COVID-19 crisis has triggered unparalleled health, social, and economic challenges worldwide. The global response to this public health emergency has been varied due to different healthcare systems, policies, and resources available to countries. It is essential that health services monitor the psychological impact on its workforce and put appropriate mitigation strategies in place. Our study is the first in the region to highlight the psychological impact on healthcare workers working in quarantine centers. Broad recommendations ranging from individual, service, and societal factors have been suggested to deal with psychological problems among healthcare workers.[19-21] Virtual consultations in quarantine centers minimize staff exposure to the virus and reduce the fear of contagion and improve mental

wellbeing. Telehealth services are practically feasible and appropriate for the support of patients, family members, and health service providers during this pandemic. The use of telehealth for global emergencies is recommended.

DECLARATIONS

Ethical Approval and Consent to Participate

This study was approved by the Institutional Review Board of Hamad Medical Corporation (MRC-05-002). Participants were provided an overview of the research, and their participation in the survey was deemed informed consent.

Consent for Publication

Not applicable

Availability of Data and Materials

The datasets analyzed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

Authors' Contribution

All authors contributed to the design, data collection, data analysis, and interpretation of the results. JL, NM, YI, and NC led the data collection. PC led the data analysis. OW, JL, MA, NM, and MM led the interpretation and presentation of results. OW and NC wrote the initial draft of the manuscript. All the authors read and approved the final manuscript.

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