SMJ Singapore Medical Journal

Burnout, anxiety and depression in healthcare workers during the early COVID-19 period in Singapore

Irene Teo[1,2,3], PhD, Sharon C Sung[1,4], PhD, Yin Bun Cheung[1,5,6], PhD,
Wei Han Melvin Wong[2], Fazila Abu Bakar Aloweni[7], MS, Hui Gek Ang[8], PhD,
Tracy Carol Ayre[7], PhD, Crystal Chai-Lim[9], PhD, Robert Chen[10], MD Ai Ling Heng[10], MASc,
Gayathri Devi Nadarajan[11], MMed, Marcus Eng Hock Ong[1,11], FRCS, Chai Rick Soh[12], MMed,
Ban Hock Tan[13], FRCP, Kenneth Boon Kiat Tan[11], MMed, Bien Soo Tan[10], FRCR,
Mann Hong Tan[14], FRCS, Puay Hoon Tan[15], FRCPA, Kenny Xian Khing Tay[14], FRCSEd(Orth),
Limin Wijaya[13], MRCP, Hiang Khoon Tan[16,17], FRCSEd, PhD

[1]Programme in Health Services and Systems Research, [2]Lien Centre for Palliative Care, Duke-NUS Medical School, [3]Department of Psychosocial Oncology, National Cancer Centre Singapore, [4]Department of Developmental Psychiatry, Institute of Mental Health, [5]Centre for Quantitative Medicine, Duke-NUS Medical School, Singapore, [6]Centre for Child Health Research, Tampere University, Tampere, Finland, [7]Division of Nursing, [8]Division of Allied Health, National Cancer Centre Singapore, [9]Medical Social Services, [10]Radiography Unit, Division of Radiological Sciences, [11]Department of Emergency Medicine, [12]Department of Anaesthesiology, [13]Department of Infectious Diseases, [14]Department of Orthopaedic Surgery, [15]Department of Pathology, [16]Division of Surgery, Singapore General Hospital, [17]Division of Surgical Oncology, National Cancer Centre Singapore, [18]SingHealth Duke-NUS Global Health Institute, Singapore

Correspondence: Dr Irene Teo, Clinical Psychologist and Assistant Professor, Lien Centre for Palliative Care, Duke-NUS Medical School, 8 College Road, Level 4 Lien Centre, Singapore 169857. irene.teo@duke-nus.edu.sg

INTRODUCTION

On March 11 2020, COVID-19 was declared a pandemic by the World Health Organization. Even as nations worldwide initiated lockdowns to flatten the curves, the pandemic has brought unprecedented challenges to healthcare workers (HCWs) in hospitals treating COVID-19. Initial studies reported nurses (compared to doctors) to be at higher risk for anxiety and depression in China[1] and non-medical HCWs (compared to doctors and nurses) to be at higher risk for anxiety in Singapore.[2] Frontline HCWs were also found to be at higher risk for psychological morbidity[1] compared to those who were not engaged in direct care of suspected or confirmed cases. However, less is known regarding risk factors such as initiation of lockdowns, experience with prior infectious disease outbreaks and job-related perceptions. Understanding these factors can help shape a healthcare system's disaster or pandemic response.

We initiated a longitudinal study to prospectively assess job-related burnout and psychological outcomes of HCWs from a large public hospital in Singapore. We present baseline findings (i.e. one time-point) gathered between March 12- April 21 2020, during which the government instituted the "Circuit Breaker". The study occurred in the third month after the first COVID-19 case was confirmed in Singapore (refer to *Figure I*).

Our primary aim was to examine rates of burnout, anxiety and depression among HCWs. Our secondary aim was to examine the psychological health impact of the following factors: initiation of the Circuit Breaker, occupational characteristics (occupation, degree of job exposure to COVID-19, job redeployment), history of being a HCW during the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak, and HCW perceptions about their jobs (perceived job risk, perceived clarity of work protocols).

METHODS

Doctors, nurses, allied health professionals, administrative and operations staff from a tertiary, COVID-19-treating public hospital with a 1785-bed capacity, were invited through work email and/or staff portals to participate. Participants completed the baseline online survey in English, either through a web link or via scanning a QR code. The study was approved by the National University of Singapore IRB (S-20-081) and exempted from review by the SingHealth Centralized IRB (2020/2160).

To maximise response rates, the study utilised brief but validated and widely-used screening measures: a one-item burnout question from the Physician Work Life Scale where a score $\geq$ 3 indicating symptoms of burnout;[3] the Generalized Anxiety Disorder-7 where the threshold score is $\geq$ 10 for anxiety;[4] and the Patient Health Questionnaire-2 where the threshold score is $\geq$ 3 for depression.[5] Perceived job risk was assessed using the item "I feel that my job puts me at great risk of exposure to COVID-19" where responses ranged from "strongly agree" to "strongly disagree" on a 6-point scale which was later recoded into a binary variable (high risk vs. low risk).[6] Perceived clarity of protocols was assessed using an adapted item "The policies and protocols have been clear and easy to follow" with the response options "yes", "no", and "neutral".[7] Presence of chronic health condition was assessed by the question "In your lifetime, have you ever been diagnosed by a physician as having a chronic disease or medical condition?" with the response options "yes", "no", and "neutral".

Descriptive statistics of the sample characteristics and outcomes of interest were tabulated. Our sample profile (i.e. age, gender, ethnicity, occupation) was similar to that of the hospital except nurses were over-represented and other HCWs under-represented. Consequently, analyses that involved all occupations were weighted by occupation to represent the hospital profile. To examine

risk factors, multivariable logistic regression analyses were conducted adjusting for age, gender, ethnicity and chronic health condition. The variable "initiation of the Circuit Breaker" was derived by coding participants into binary groups of when they completed the survey: pre- vs. during-circuit breaker. STATA version 15.0 was used.

RESULTS

A total of 1410 HCWs (15% doctors, 58% nurses, 27% others) completed the survey. It is estimated that 23%, 13% and 10% of the population experienced symptoms of burnout, anxiety and depression, respectively. Nurses reported the highest burnout, anxiety and depression rates followed by other HCWs and doctors. Refer to *Table I* for further details.

Compared to HCWs who found work policies and protocols to be clear, those who found them unclear reported higher rates of burnout (OR=4.86, 95% CI: 2.57-9.21), anxiety (OR=3.75, 95% CI: 1.89-7.43), and depression (OR=4.06, 95% CI: 1.99-8.29). Compared to doctors, nurses reported higher rates of burnout (OR=1.96, 95% CI: 1.19-3.21) and depression (OR=2.08, 95% CI: 1.00-4.29). Those who were HCWs during the SARS outbreak (OR=2.09, 95% CI: 1.18-3.70) or perceived their job to be high-risk (OR=1.68, 95% CI: 1.08-2.62) reported higher rates of anxiety than those who did not. The initiation of the Circuit Breaker, degree of job exposure to suspected or confirmed COVID-19 cases, and being redeployed were not associated with burnout, anxiety or depression (p's> .05). Refer to Table 2 for details.

DISCUSSION

Psychological morbidity rates of Singapore HCWs were comparable to published samples from China and Singapore during early-stages of this pandemic.[1,2,8] For instance, the rates of anxiety

using the same measure indicate less than 2% difference for doctors (our sample, 10% vs. Lai et al., 11.6%) and nurses (our sample 14%, Lai et al., 12.7%). Rates of job burnout, anxiety and depression in our sample also remained stable after the initiation of the Circuit Breaker. Nevertheless, it is important to interpret our findings in the context of a defined HCW population and timing of the study. For instance, our prevalence rates of anxiety are lower compared to that of a local study using the same anxiety measure, but conducted specifically with laboratory HCWs who were exposed to blood samples that include confirmed or suspected SARS-CoV-2 and that were surveyed toward the end of the circuit breaker period (our sample, 10% vs. Teo et al., 24.3%).[9] Taken together, it will be important to continue monitoring these psychological outcomes, as the long-term nature of the pandemic and vigilance toward subsequent-wave outbreaks may take its toll on HCWs. In turn, the quality of patient care delivery and safety may be affected.

Being a nurse, having worked as a HCW during the 2003 SARS outbreak, and perceiving high job risk was associated with poorer mental health. Nurses have previously been shown to report higher psychological morbidity compared to doctors, potentially because of their close, frequent contact with patients and less experience in dealing with infectious diseases.[1] The SARS outbreak in 2003 had left a deep impression on HCWs and the healthcare system in Singapore,[6] and this is evidenced by reports of higher anxiety amongst HCWs who had experienced SARS. It is noted that perception of job risk, rather than more objective job characteristics (i.e. job redeployment, exposure to suspected/ confirmed cases) was associated with anxiety. This finding underscores that healthcare systems that are keen on addressing HCW anxiety first need to understand their staff perspectives and perception of risks.

The percentage of HCWs in our sample who found work policies and protocols to be unclear is small; however, it is striking that the lack of clarity is associated with close to five-fold the rate of burnout and four-fold the rates of anxiety and depression. Dissemination of new work protocols during a time of crisis can be challenging, especially when they are frequently modified due to rapidly changing pandemic conditions and evolving knowledge of the disease. Our findings suggest that clear communication of new/ changed work protocols to HCWs (and/or assessing whether they are well understood) can potentially reduce some of the negative outcomes experienced.

There are limitations to the current study. Our hospital system is large and the response rate (16%) may not reflect the majority of our HCW population; we dealt with this by using weighted analyses. Our cross-sectional examination of the baseline data also makes it difficult to draw causal conclusions. Although our measurement tools are validated, they are short to facilitate assessment over time and mitigate survey fatigue; for instance, we used a one-item burnout question. However, we believe our findings offer information that is useful for healthcare systems to consider in shaping their disaster and pandemic response and supporting their healthcare workforce during this extraordinary time.

ACKNOWLEDGEMENTS

REFERENCES

1. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open 2020; 3:e203976.

2. Tan BY, Chew NW, Lee GK, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. Ann Intern Med 2020; 173:317-20.

3. Dolan ED, Mohr D, Lempa M, et al. Using a single item to measure burnout in primary care staff: a psychometric evaluation. J Gen Intern Med 2015; 30:582-7.

4. Spitzer RL, Kroenke K, Williams JB, Löwe B. A brief measure for assessing generalized anxiety disorder: the GAD-7. Arch Intern Med 2006; 166:1092-7.

5. Kroenke K, Spitzer RL, Williams JB. The Patient Health Questionnaire-2: validity of a two-item depression screener. Med Care 2003; 41:1284-92.

6. Koh D, Lim MK, Chia SE, et al. Risk perception and impact of Severe Acute Respiratory Syndrome (SARS) on work and personal lives of healthcare workers in Singapore: what can we learn? Med Care 2005; 43:676-82.

7. Shiao JSC, Koh D, Lo LH, Lim MK, Guo YL. Factors predicting nurses' consideration of leaving their job during the SARS outbreak. Nurs Ethics 2007; 14:5-17.

8. Du J, Dong L, Wang T, et al. Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. Gen Hosp Psychiatry 2020; 67:144-5.

9. Teo WZY, Soo YE, Yip C, Ong L, Lee CT. The psychological impact of COVID-19 on 'hidden' frontline healthcare workers. Int J Soc Psychiatry 2020 Aug 11. https://doi.org/10.1177/0020764020950772. [Epub ahead of print]
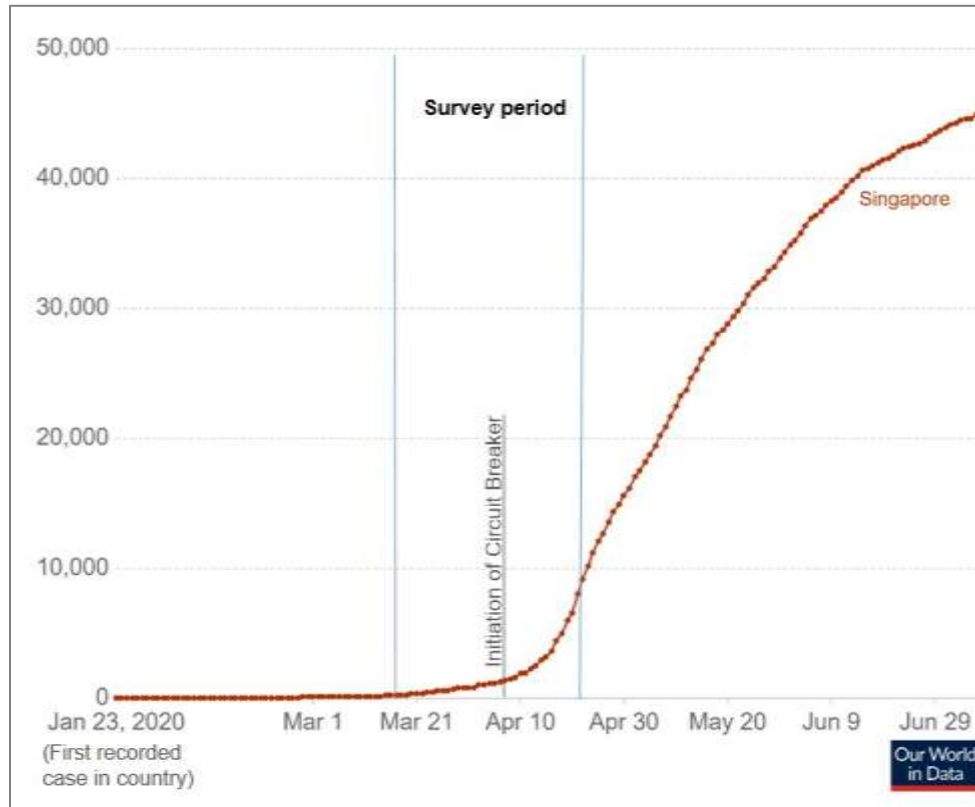
Figure I. Survey period in relation to the COVID-19 pandemic in Singapore.
[Graph generated through *Our World In Data (https://ourworldindata.org/)*, with raw data sourced from the European Centre for Disease Prevention and Control]

Table I. **Healthcare worker characteristics, psychological morbidity and perceptions**

	Doctors (*n*= 204)	Nurses (*n*= 822)	Others* (*n*= 384)	Total† *N*= 1410
	M (SD) or *N (%)*			
Mean age, *years*	37.1 (9.9)	34.6 (10.3)	37.5 (11.6)	35.8 (10.6)
Gender				
Female	97 (48%)	702 (85%)	280 (73%)	1079 (77%)
Ethnicity				
Chinese	174 (85%)	400 (49%)	286 (75%)	860 (61%)
Indian	19 (9%)	85 (10%)	27 (7%)	131 (9%)
Malay	1 (0%)	194 (24%)	36 (9%)	231 (16%)
Others	10 (5%)	143 (17%)	35 (9%)	188 (13%)
Chronic health condition(s), *yes*	35 (17%)	181 (22%)	89 (23%)	305 (22%)
Healthcare worker during SARS	46 (23%)	172 (21%)	85 (22%)	303 (21%)
Job exposure to suspected/ confirmed COVID-19 cases				
Daily	38 (19%)	217 (26%)	43 (11%)	298 (21%)
Occasionally	129 (63%)	397 (48%)	94 (24%)	620 (44%)
Not at all	37 (18%)	208 (25%)	247 (64%)	492 (35%)
Job redeployment due to COVID-19	23 (11%)	65 (8%)	47 (12%)	135 (10%)
Responded before circuit breaker	189 (93%)	574 (70%)	193 (50%)	956 (68%)
Burnout[a]	1.99 (0.69)	2.19 (0.82)	2.19 (0.82)	2.12 (0.80)
% reporting burnout symptoms	31 (15%)	227 (28%)	79 (21%)	321 (23%)
Anxiety[b]	4.56 (4.22)	4.99 (4.58)	4.99 (4.58)	4.88 (4.48)
% reporting anxiety	21 (10%)	114 (14%)	50 (13%)	184 (13%)
Depression[c]	0.84 (1.16)	1.09 (1.31)	0.98 (1.28)	1.02 (1.29)
% reporting depression	12 (6%)	94 (11%)	38 (10%)	141 (10%)
Perceived job risk				
High	148 (73%)	648 (79%)	202 (53%)	929 (66%)
Low	56 (27%)	174 (21%)	182 (47%)	481 (34%)
Perceived clarity of work protocols				
Clear	121 (59%)	540 (66%)	261 (68%)	930 (66%)
Neutral	68 (33%)	257 (31%)	104 (27%)	417 (30%)
Not clear	15 (7%)	25 (3%)	19 (5%)	63 (4%)

*Includes allied health professionals, pharmacists, administrative staff and operations staff. †Weighted total for burnout, anxiety, depression, perceived job risk and perceived clarity of work protocols.
[a] Assessed using the one burnout item in the Physician Work Life Scale where a score ≥ 3 indicate burnout;
[b] assessed using the Generalized Anxiety Disorder-7 scale where a score ≥ 10 indicate moderate anxiety;
[c] assessed using the Patient Health Questionnaire-2 where a score ≥ 3 indicate symptoms of depression.
Percentages may not add up to 100 due to rounding.

Table **2. Predictors of burnout, anxiety and depression (N=1140)**

	Burnout	Anxiety	Depression
		Odds ratio [95% CI]	
Initiation of circuit breaker (CB) *(ref: Pre-CB)*			
CB	0.98 [0.70,1.36]	1.17 [0.78,1.75]	1.05 [0.66,1.66]
Occupational characteristics			
Occupation *(ref: Doctor)*			
Nurse	1.96** [1.19,3.21]	1.11 [0.61,2.00]	2.08* [1.00,4.29]
Others	1.63 [0.96,2.79]	1.29 [0.69,2.44]	2.08 [0.93,4.64]
Job exposure *(ref: None)*			
Daily	1.26 [0.82,1.92]	1.01 [0.59,1.72]	1.23 [0.66,2.29]
Occasionally	1.07 [0.76,1.50]	0.98 [0.64,1.48]	1.14 [0.72,1.83]
Job redeployment	1.11 [0.69,1.79]	1.31 [0.74,2.32]	1.06 [0.56,2.02]
Healthcare worker during SARS	1.06 [0.65,1.74]	2.09* [1.18,3.70]	1.55 [0.73,3.29]
Healthcare worker perceptions			
Perceive job to be risky	1.05 [0.75,1.46]	1.68* [1.08,2.62]	1.23 [0.78,1.95]
Clarity of work protocols *(ref: Clear)*			
Not clear	4.86**[2.57,9.21]	3.75**[1.89,7.43]	4.06**[1.99,8.29]
Neutral	2.12**[1.57,2.87]	1.63* [1.12,2.37]	1.91**[1.26,2.89]

Analyses were weighted by occupation and adjusted for age, gender, ethnicity and chronic health condition; Ref= reference group, SARS = Severe Acute Respiratory Syndrome; $^*p < 0.05$, $^{**}p < 0.01$.