Factors affecting mental health outcomes of healthcare workers at Cardinal Santos Medical Center during the Coronavirus Disease (COVID-19) pandemic

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Abstract

Background. Studies show that healthcare workers from previous pandemics have experienced high levels of stress, anxiety with negative psychological impacts. This paper aims to identify factors affecting mental health outcomes of healthcare workers during Coronavirus Disease (COVID-19) pandemic.

Methods. A cross-sectional design was used to determine factors affecting mental health outcome of healthcare workers with direct contact to patients with COVID-19. Depression, anxiety and distress were measured by the nine-item Patient Health Questionnaire, seven-item Generalized Anxiety Disorder scale, and 22-item Impact of Event Scale–Revised, respectively. Binomial multiple logistic regression model was used to identify the factors associated with mental health outcome.

Results. 172 healthcare workers were included. Prevalence of depression, anxiety and distress symptoms among all healthcare workers were 57%, 47.7%, 65.1%, respectively. Age and living with a family with comorbidities are significantly associated with depression and anxiety. Healthcare workers aged 31 years and above are 70% less likely to have depression symptoms (OR 0.278, CI 95%, 0.11-0.72 p=0.008 and OR 0.273, CI 95%, 0.12-0.61, p=0.002). Those living with relatives with comorbidities are 2.7 times more likely to experience depression symptoms (OR 2.731, CI 95%, 1.36-5.5, p=0.005). Healthcare workers age 31-40 years has 80% less likely to experience anxiety symptoms (OR 0.212, CI 95%, 0.09-0.5, p<0.001), and those age 41 and above have 73% less likely to have anxiety symptoms (OR 0.37, CI 95%, 0.14-0.98, p<0.045). Those living with relatives with comorbidities are 2.9 times more likely to have anxiety symptoms (OR 2.889, CI 95%, 1.46-5.73, p=0.002). Level of knowledge on COVID-19 among health care workers significantly differs across severity but has no significant association with prevalence of depression. No factors were associated with distress symptom.

Conclusion. Cognizant of high rates of depression, anxiety and distress among our younger healthcare workers living with relatives with comorbidities will be a challenge to establish and/or improve existing programs to promote and address mental health needs. Psychological stress can accumulate over time and have an impact later in the outbreak which should be investigated in future studies.

Keywords: Mental health outcomes, Healthcare workers, COVID-19

Introduction

Background of the study. The novel COVID-19 disease was first reported in December 2019 in Wuhan, China.[1] The World Health Organization (WHO) in January 2020, declared the outbreak of COVID-19 to be a public health emergency of international concern. COVID-19 was then declared to be a pandemic by March 2020.[2] As of October 5, 2020, there are over 34.8 million recorded cases and over 1 million recorded deaths of COVID-19 globally by the World Health Organization.[3] The Philippines' Department of Health confirmed 329,637 cases and 5,925 of deaths from COVID-19 as of October 7, 2020.[4] The number of health workers who tested positive for the coronavirus was 5,008, with majority of infections seen in nurses and physicians. The top five medical professions that reported COVID-19 cases are nurses (1,734 cases), physicians (1,100), nursing assistants (338), medical technologists (210), and radiologic technologists (119) as of August 3, 2020.[5]

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Studies show that healthcare workers from previous pandemics (A/H1N1 influenza; severe acute respiratory syndrome, SARS), have experienced high levels of stress, anxiety and low mood with negative psychological impacts sustained after one year.[6-8] A number of factors including increasing number of confirmed and suspected cases, Irregular working hours and overwhelming workload, depletion of personal protection equipment, widespread media coverage, lack of specific drugs, and feelings of being inadequately supported may all contribute to the mental burden of these healthcare workers.[9-10] The extreme pressures experienced by healthcare workers during a pandemic may increase their risk of burnout, which has adverse outcomes not only for individual wellbeing, but also for patient care and the healthcare system.[11] Lai, J. et al. reported that health workers directly engaged in the care of patients with COVID-19 experienced symptoms of depression, anxiety, and distress by 50.4%, 44.6%, and 71.5%, respectively. Most were female health workers, aged 26-40 years old, married, with a junior technical title.[12] A similar research done by Kang, et al revealed 36% percent of the medical staff had subthreshold mental health disturbances, 34.4% had mild disturbances, 22.4% had moderate disturbances and 6.2% had severe disturbances, in the immediate wake of the viral epidemic. Most were female (85.5%), aged 25 to 40 years (63.4%), married (56.9%), have an educational level of undergraduate or less (85%), and have a junior technical title (66.3%). 17 to 50% had participated in counseling or psychotherapy, had accessed psychological materials, and psychological resources available through media. Trends in levels of psychological distress and factors such as exposure to infected people and psychological assistance were identified. These findings emphasize the importance of being prepared to support frontline workers through mental health interventions at times of widespread crisis.[13] These shows that concerns about the mental health, psychological adjustment, and recovery of healthcare workers treating and caring for patients with COVID-19 are now rising.[12,13]

Knowledge of a disease may influence a healthcare workers' attitudes and practices, and incorrect attitudes and practices directly increase the risk of infection.[14] Older people and people with pre-existing medical conditions (such as diabetes, heart disease, preexisting heart condition, chronic obstructive lung disease, asthma) appear to be more vulnerable to becoming severely ill with the COVID-19 virus.[15] The Chinese Center for Disease Control and Prevention reported a case fatality rate (CFR) of 2.3% (1023 deaths among 44,672 confirmed cases). The case fatality rate was as high as 7.3% in diabetes and 6.0% in hypertension.[16] A study done by Zhang et al. showed a positive correlation between knowledge, attitude and practices of healthcare workers during COVID-19 pandemic.[17]

This paper aims to identify factors affecting mental health outcomes of healthcare workers during COVID-19 pandemic at the Cardinal Santos Medical Center.

Research Question. What are the factors affecting mental health outcomes among healthcare workers during the COVID-19 pandemic at Cardinal Santos Medical Center?

> *Population (P)* – Healthcare workers employed at Cardinal Santos Medical Center with direct patient exposure during the COVID-19 pandemic
> *Exposure (E)* – Demographic data, clinical factors, psychological services availed, knowledge on COVID-19
> *Outcome (O)* – Mental health outcomes
> *Methods (M)* – Cross-sectional study

Objective of the study

General Objectives. This paper aims to identify the factors affecting mental health outcome of healthcare workers during the COVID-19 pandemic at the Cardinal Santos Medical Center from March 2020 to September 2020.

Specific Objectives. This paper specifically aims to:

1. Determine the prevalence of mental health outcome in terms of depression (measured by the 9-item Patient Health Questionnaire (PHQ-9), anxiety (measured by seven-item Generalized Anxiety Disorder (GAD-7), and distress (measured by 22-item Impact of Event Scale-Revised (IES- R) of healthcare workers during the COVID-19 pandemic.
2. Identify the factors (demographic data, clinical factors, knowledge on Coronavirus Disease COVID-19 and psychological services availed) affecting mental health and its association to mental health outcome.

Significance of the study. Depression anxiety and distress may be viewed as normal emotional reactions to stress in the face of a pandemic.[18] Healthcare workers are at risk of emotional strain and physical exhaustion from the provision of care to growing numbers of rapidly deteriorating patients; exposure to critical illness or death of their co-workers; and moral dilemmas in decision making around provision of care with limited resources.[19-20]

There is a need to recognize mental health as an important component of our health care workers' well-being, and provide them with mental support whether through face-to-face counseling or comparable support through digital platforms such as cell phone interfaces to extend their immediate efficiency and to better protect their overall sense of well-being in the long term.[13] Building a culture of organizational resilience may help to reduce the psychological manifestations requiring immediate attention and treatment.

Scope and Limitations. This is a cross-sectional study involving only healthcare workers with direct contact to a patient with confirmed or suspected case of COVID-19 at Cardinal Santos Medical Center from March 2020 to September 2020 employed during the study period. The following healthcare workers were included: physicians, nurses, nursing assistants, respiratory therapists, medical technologists, radiologic technologists, cardiac therapists

with direct contact to a patient with confirmed or suspected case of COVID-19. The mental health outcomes of depression, anxiety and distress were measured using the nine-item Patient Health Questionnaire (PHQ-9), the seven-item Generalized Anxiety Disorder (GAD-7), and the 22-item Impact of Event Scale-Revised (IES-R), respectively. Factors affecting mental health were identified in terms of demographic data, clinical factors, knowledge of COVID-19 and psychological services availed and its association to mental health outcome were determined.

Definition of Terms.

Mental health outcome – important part of overall health and well-being which includes emotional, psychological, and social wellbeing.[22] In this study, depression, anxiety, and distress were measured using the nine-item Patient Health Questionnaire (PHQ-9), the seven-item Generalized Anxiety Disorder (GAD-7), and the 22-item Impact of Event Scale-Revised (IES- R) respectively.

Depression – characterized by feelings of sadness and/or a loss of interest in activities once has previously enjoyed.[23] In this study, PHQ-9 was used to measure the severity of depression, with the total scores categorized as follows: minimal/no depression (1-4), Mild depression (5–9), moderate depression (10–14), or severe depression (15–21).[24]

Anxiety - characterized by feelings of tension, worried thoughts and physical changes.[25] In this study, GAD-7 was used to evaluate the severity of anxiety The total scores are categorized as follows: minimal/no anxiety (0-4), mild anxiety (5–9), moderate anxiety (10–14), or severe anxiety (15–21).[26]

Distress – characterized by excessive fatigue or exhaustion.[27] In this study, the IES-R was used to measure the response to a specific stressful life event. The event used for this questionnaire was the occurrence of COVID-19. The total scores are categorized as follows: subclinical (0–8), mild distress (9–25), moderate distress (26–43), and severe distress (44–88).[28]

Healthcare worker – a worker involved in COVID-19 prevention and treatment and exposed to with confirmed or suspected cases through patient screening, inspection, testing, transport, treatment, nursing, specimen collection, pathogen detection, pathologic examination, or pathologic anatomy of medical and healthcare professional and technical personnel.[15] In this study, the following were included: physicians, nurses, nursing assistants, respiratory therapists, medical technologists, radiologic technologists, cardiac therapists with direct contact to a patient with confirmed or suspected case of COVID-19.

COVID-19 pandemic – a disease caused by the SARS-CoV-2 virus that was first reported and then became widespread within Wuhan, the capital city of Hubei Province of China. This disease rapidly spread throughout China and elsewhere, becoming a global health emergency.[29]

Demographic data – In this study, these included age (years), sex (male or female), marital status (single, married), occupation (physicians, nurses, nursing assistants, respiratory therapists, medical technologists, radiologic technologists, cardiac therapists), years in practice, and living with a family member or non-family member with or without comorbidities.

Clinical factors – Preexisting conditions such as diabetes, heart disease, preexisting heart condition, chronic obstructive lung disease, and asthma. These were identified by the World Health Organization as risk factors predisposing an individual to become severely ill with COVID-19.[29]

Psychological care – includes psychological materials, psychological resources available through, and counseling or psychotherapy to support the holistic well-being of an individual.[13]

Knowledge on COVID-19 – This is a 10-item true or false question regarding knowledge of healthcare workers on COVID-19 based on Question and Answer about COVID-19 in the webpage of WHO and was lifted from the study of Giao, H. et. al and the Center for Disease Control on COVID 19.[30,33-34] Each correct answer in relation to the knowledge of COVID-19 was given one point. The total knowledge score for the HCWs varied between 0 (with no correct answer) and 10 (for all correct answers), and a cut off level of <7 was evaluated as poor knowledge, and >7 indicated good knowledge.[32]

Methodology

Research Design. This is a cross-sectional study of factors affecting mental health outcomes of healthcare workers during the COVID-19 pandemic at Cardinal Santos Medical Center. The conceptual framework of the study is depicted in *Figure 1*.

Sampling Design. Inclusion Criteria: Healthcare workers with direct contact to patients with COVID-19 at Cardinal Santos Medical Center from March 2020 to September 2020 employed during the study period.

Exclusion Criteria: Volunteer health workers, healthcare workers with less than three months work experience, healthcare workers who did not have direct contact to a patient with suspected or known case of COVID-19, healthcare worker who did not give consent, did not
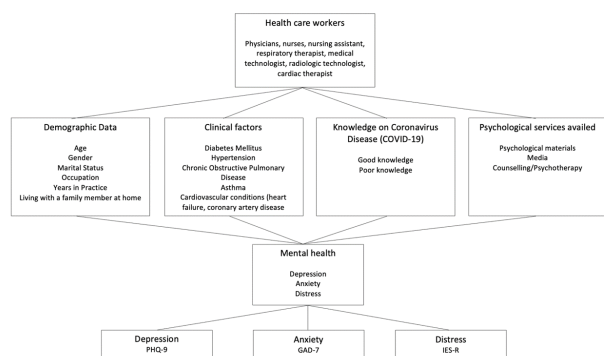

Figure 1. Conceptual Framework of the Study

complete questionnaire or gave no response after three consecutive follow-ups.

Sample Size. Using OpenEpi version 3, sample size was computed using 95% confidence interval, a population size of 157 based on the 263 healthcare workers (40 physicians, 150 nurses and nursing assistants, 26 respiratory therapists, 14 medical technologists, 10 radiologic technologists, and 23 cardiac therapists) with direct contact to COVID-19 patients at Cardinal Santos Medical Center from March 2020 to September 2020. All that passed the inclusion criteria and exclusion criteria will be requested to participate. A hypothesized frequency of 50% was used based on the prevalence of mental health outcomes in terms of depression, anxiety, and distress from the study of Lai, et al., and Kang, et al.[12-13]

Procedure. The research protocol was technically approved by the Cardinal Santos Medical Center's Institutional Review Board. Initiation of study was done after permission was granted from the Chairman of Human Resource Management, Head of Ancillary Division, and Nursing Research Team of Cardinal Santos Medical Center.

A written questionnaire was distributed thru the section heads of the Residents Training officer, Nursing Research Team, Head of Ancillary (which includes the Pulmonary section, Cardiology section, Laboratory section and Radiologic Section) and results were collected within one week. A digital questionnaire via Google Form was available. Department and Section Heads sent this thru email blast to all healthcare workers involved. The researcher followed up the department/section heads three times before excluding the participant who did not answer the questionnaire before dropping off the respondent.

Data were encoded by the researcher and statistician. The researcher, adviser and statistician only have access to both hard copy and electronic copy of the results of the research. Hard copy was stored on a cabinet with lock and key. The electronic copy was stored in a password protected document. After one year, the hard copy will be shredded and electronic data will be deleted.

After data collection, those who were noted to have severe depression, anxiety and/or distress were recommended to have a psychiatric referral for evaluation.

Statistical Analysis. 172 healthcare workers participated in this study which was more than the estimated sample size. Study variables were summarized as percentages for categorical variables and median (IQR) for continuous variables. The significant differences in severity of symptoms among different subgroups were determined using Fisher's exact test for categorical variables and Mann-Whitney test (2 groups) or Kruskal-Wallis test (more than 2 groups), for continuous variables.

Univariate and multivariate binomial logistic regression model was used to determine the crude and adjusted association of demographic and clinical factors, psychological services availed and knowledge on

COVID19 with the prevalence of depression, anxiety, and distress symptoms. Odds ratios were computed to determine strength of associations.

Sensitivity analysis was not done in this study.

Ethical Considerations. The clinical protocol was reviewed and approved by the Research Ethics Review Committee (RERC) of the Cardinal Santos Medical Center. The researchers ensured that all information gathered were kept strictly confidential and used solely for the purpose

Table I. Demographic profile, clinical factors, psychological services availed and knowledge on COVID-19 of healthcare workers during Coronavirus Disease (COVID-19) pandemic at Cardinal Santos Medical Center (n=172)

Characteristic	n (%)
Age group	
20-30	109 (63.4%)
31-40	39 (22.7%)
≥41	24 (13.9%)
Sex	
Male	61 (35.5%)
Female	111 (64.5%)
Marital Status	
Single	140 (81.4%)
Married	32 (18.6%)
Occupation	
Physician	32 (18.6%)
Nurse	77 (44.8%)
Nursing assistant	25 (14.5%)
Respiratory therapist	16 (9.3%)
Radiologic technologist	13 (7.6%)
Medical technologist	5 (2.9%)
Cardiac therapist	4 (2.3%)
Years in practice	
<5years	118 (68.6%)
5-20 years	33 (19.2%)
>20years	21 (12.2%)
Number of people living with you at home	3 (1-5)
Living with relative	119 (69.2%)
Living with non-relative	37 (21.5%)
Living with relative with comorbidities	63 (36.6%)
Living with non-relative with comorbidities	5 (2.9%)
Comorbidities	
None	132 (76.7%)
Asthma	14 (8.1%)
Hypertension	12 (7%)
Other preexisting conditions	9 (5.2%)
Diabetes mellitus	4 (2.3%)
Other cardiovascular conditions	2 (1.2%)
Chronic obstructive pulmonary disease	1 (0.6%)
Psychological support	
None	137 (79.7%)
Psychological resources available through media	23 (13.4%)
Psychological materials	8 (4.7%)
Counselling or therapy	8 (4.7%)
Others	4 (2.3%)
Knowledge	
Good	122 (70.9%)
Poor	50 (29.1%)

Table II. Severity of depression, anxiety and distress symptoms by age

Severity category	Total n (%)	CI	20-30	CI	31-40	CI	41-50	CI	p-value
						Age group			
PHQ-9, depression symptoms									
Severity									*0.004*
None	74 (43%)	35.8-50.6	36 (33%)	24.8-42.5	23 (59%)	42.8-73.4	15 (62.5%)	41.6-79.6	
Mild	55 (32%)	25.4-39.4	34 (31.2%)	23.1-40.6	14 (35.9%)	22.3-52.2	7 (29.2%)	14.3-50.5	
Moderate	24 (14%)	9.5-20	20 (18.4%)	12.1-26.9	2 (5.1%)	1.2-18.8	2 (8.3%)	2-28.7	
Moderately severe	15 (8.7%)	5.3-14	15 (13.8%)	8.4-21.7	0		0		
Severe	4 (2.3%)	0.9-6.1	4 (3.7%)	1.4-9.5	0		0		
Score	6 (2-9.5)		7 (4-12)		4 (0-6)		1.5 (0-7)		*0.0001*
GAD-7, anxiety									
Severity									*0.02*
None	90 (52.3%)	44.8-59.8	47 (43.1%)	34.1-52.7	28 (71.8%)	55.5-83.8	15 (62.5%)	41.6-79.6	
Mild	48 (27.9%)	21.7-35.1	32 (29.4%)	21.5-38.7	9 (23.1%)	12.3-39.1	7 (29.2%)	14.3-50.5	
Moderate	22 (12.8%)	8.5-18.7	19 (17.4%)	11.3-25.8	2 (5.1%)	1.2-18.8	1 (4.2%)	0.6-25.4	
Severe	12 (7%)	4-11.9	11 (10.1%)	5.6-17.4	0		1 (4.2%)	0.6-25.4	
Score	4	1-8	6	2-10	3	0-5	3	2-0	*0.0035*
IES-R, distress symptoms									
Severity									*0.076*
Normal	60 (34.9%)	28.1-42.4	37 (33.9%)	25.6-43.4	16 (41%)	26.6-57.2	7 (29.2%)	14.3-50.5	
Mild	69 (40.1%)	33-47.7	37 (33.9%)	25.6-43.4	20 (51.3%)	35.7-66.6	12 (50%)	30.5-69.5	
Moderate	33 (19.2%)	13.9-25.8	26 (23.9%)	16.7-32.8	3 (7.7%)	2.4-21.7	4 (16.7%)	6.2-37.6	
Severe	10 (5.8%)	3.1-10.5	9 (8.3%)	4.3-15.2	0		1 (4.2%)	0.6-25.4	
Score	13	6-24	13	6-31	12	5-18	14	7-21	*0.2198*

Table III. Severity of depression, anxiety and distress symptoms by sex and marital status

Severity category	Male	CI	Female	CI	p-value	Single	CI	Married	CI	p-value
	Sex					Marital Status				
PHQ-9, depression symptoms										
Severity					0.442					0.206
None	30 (49.2%)	36.8-61.7	44 (39.6%)	30.9-49.1		56 (40%)	32.1-48.4	18 (56.3%)	38.6-72.4	
Mild	20 (32.8%)	22.1-45.6	35 (31.5%)	23.5-40.8		45 (32.1%)	24.9-40.4	10 (31.3%)	17.5-49.4	
Moderate	6 (9.8%)	4.4-20.4	18 (16.2%)	10.4-24.4		20 (14.3%)	9.4-21.2	4 (12.5%)	4.7-29.4	
Moderately severe	5 (8.2%)	3.4-18.4	10 (9%)	4.9-16		15 (10.7%)	6.5-17.1	0		
Severe	0		4 (3.6%)			4 (2.9%)	1.1-7.4	0		
Score	5 (2-8)		6 (2-11)		0.1438	6 (3-10)		3 (0-6.5)		0.0032
GAD-7, anxiety										
Severity					0.499					0.779
None	32 (52.5%)	39.8-64.8	58 (52.3%)	42.9-61.5		72 (51.4%)	43.1-59.7	18 (56.3%)	38.6-72.4	
Mild	20 (32.8%)	22.1-45.6	28 (25.2%)	17.9-34.2		38 (27.1%)	20.4-35.2	10 (31.3%)	17.5-49.4	
Moderate	5 (8.2%)	3.4-18.4	17 (15.3%)	9.7-23.4		19 (13.6%)	8.8-20.4	3 (9.4%)	3-25.9	
Severe	4 (6.6%)	2.4-16.4	8 (7.2%)	3.6-13.9		11 (7.9%)	4.4-13.7	1 (3.1%)	0.4-19.8	
Score	4 (0-7)		4 (1-9)		0.4009	4 (1-9)		3.5 (0-7)		0.2889
IES-R, distress symptoms										
Severity					0.051					0.257
Normal	27 (44.3%)	32.2-57	33 (29.7%)	21.9-39		50 (35.7%)	28.1-44.1	10 (31.3%)	17.5-49.4	
Mild	19 (31.2%)	20.7-44	50 (45.1%)	36-54.5		52 (37.1%)	29.5-45.5	17 (53.1%)	35.8-69.8	
Moderate	14 (23%)	14-35.3	19 (17.1%)	11.1-25.4		28 (20%)	14.1-27.5	5 (15.6%)	6.5-33	
Severe	1 (1.6%)	0.2-11	9 (8.1%)	4.2-15		10 (7.1%)	3.9-12.8	0		
Score	11 (3-20)		14 (7-26)		0.1013	13 (5.5-26.5)		13.5 (7.5-21)		0.8314

of the study. The study involved participants to answer a questionnaire on the Factors affecting mental health outcomes of healthcare workers during the COVID-19 pandemic at the Cardinal Santos Medical Center. Identification numbers were used to assure and protect the privacy of patients. An informed consent was given is attached together with the questionnaire. The researchers used personal fund. There was no other source of external funds. No conflict of interest is declared.

Results

Demographic profile. In this study, purposeful sampling was done and questionnaires were distributed to different section heads and were given to healthcare workers at Cardinal Santos Medical Center with direct contact to patients with COVID-19 from March 2020 to September 2020. A total of 172 healthcare workers (from an initial sample size of 157) participated in the study. 64.5% were females, most within the age range 20-30 years old

Table IV. Severity of depression, anxiety and distress symptoms by occupation

Severity category					Occupation				
	Physicians	CI	Nurses	CI	Nursing Aides	CI	Therapists and Technologists	CI	p-value
PHQ-9, depression symptoms									
Severity									0.281
None	16 (50%)	33-67	31 (40.3%)	29.8-51.7	14 (56%)	36.1-74.1	13 (34.2%)	20.8-50.8	
Mild	9 (28.1%)	15.1-46.3	29 (37.7%)	27.5-49.1	5 (20%)	8.4-40.6	12 (31.6%)	18.7-48.1	
Moderate	6 (18.8%)	8.5-36.4	10 (13%)	7.1-22.6	2 (8%)	1.9-27.7	6 (15.8%)	7.1-31.3	
Moderately severe	0		5 (6.5%)	2.7-14.8	4 (16%)	6-36.4	6 (15.8%)	7.1-31.3	
Severe	1 (3.1%)	0.4-19.8	2 (2.6%)	0.6-10	0		1 (2.6%)	0.4-17	
Score	4.5 (1.5-9)		6 (3-9)		3 (1-9)		8 (3-12)		0.2051
GAD-7, anxiety									
Severity									0.487
None	19 (59.4%)	41.5-75.1	38 (49.4%)	38.3-60.5	15 (60%)	39.7-77.3	18 (47.4%)	32-63.3	
Mild	10 (31.3%)	17.5-49.4	25 (32.5%)	22.9-43.8	6 (24%)	10.9-44.8	7 (18.4%)	8.9-34.3	
Moderate	2 (6.3%)	1.5-22.4	9 (11.7%)	6.1-21.1	3 (12%)	3.8-32	8 (21.1%)	10.7-37.2	
Severe	1 (3.1%)	0.4-19.8	5 (6.5%)	2.7-14.8	1 (4%)	0.5-24.6	5 (13.2%)	5.5-28.4	
Score	3 (0-6.5)		5 (1-8)		3 (0-8)		5 (2-13)		0.1921
IES-R, distress symptoms									
Severity									0.622
Normal	14 (43.8%)	27.6-61.4	29 (37.7%)	27.5-49.1	7 (28%)	13.7-48.8	10 (26.3%)	14.6-42.7	
Mild	11 (34.4%)	19.9-52.5	31 (40.3%)	29.8-51.7	12 (48%)	29.2-67.4	15 (39.5%)	25.1-55.9	
Moderate	7 (21.9%)	10.6-39.8	12 (15.6%)	9-25.6	4 (16%)	6-36.4	10 (26.3%)	14.6-42.7	
Severe	0		5 (6.5%)	2.7-14.8	2 (8%)	1.9-27.7	3 (7.9%)	2.5-22.2	
Score	9.5 (2-22.5)		13 (6-21)		16 (8-23)		15 (8-36)		0.3502

Table V. Severity of depression, anxiety and distress symptoms by living with a relative or non-relative at home

Severity category	Living with relative					Living with non-relative				
	Yes	CI	No	CI	p-value	Yes	CI	No	CI	p-value
PHQ-9, depression symptoms										
Severity					0.004					0.352
None	51 (42.9%)	34.2-52	23 (43.4%)	30.6-57.1		16 (43.2%)	28.2-59.7	58 (43%)	34.8-51.5	
Mild	43 (36.1%)	27.9-45.2	12 (22.6%)	13.2-36		8 (21.6%)	11-38	47 (34.8%)	27.2-43.3	
Moderate	19 (16%)	10.4-23.8	5 (9.4%)	3.9-21		7 (18.9%)	9.2-35.1	17 (12.6%)	7.9-19.4	
Moderately severe	5 (4.2%)	1.7-9.8	10 (18.9%)	10.4-31.9		5 (13.5%)	5.6-29	10 (7.4%)	4-13.3	
Severe	1 (0.8%)	0.1-5.8	3 (5.7%)	1.8-16.4		1 (2.7%)	0.4-17.4	3 (2.2%)	0.7-6.7	
Score	6(2-9)		6(2-14)		0.1749	6(2-11)		6(2-9)		0.4127
GAD-7, anxiety										
Severity					0.089					0.229
None	63 (52.9%)	43.9-61.8	27 (50.9%)	37.5-64.2		20 (54.1%)	37.8-69.5	70 (51.9%)	43.4-60.2	
Mild	38 (31.9%)	24.1-40.9	10 (18.9%)	10.4-31.9		7 (18.9%)	9.2-35.1	41 (30.4%)	23.1-38.7	
Moderate	12 (10.1%)	5.8-17	10 (18.9%)	10.4-31.9		8 (21.6%)	11-38	14 (10.4%)	6.2-16.8	
Severe	6 (5%)	2.3-10.9	6 (11.3%)	5.1-23.2		2 (5.4%)	1.3-19.7	10 (7.4%)	4-13.3	
Score	4(0-7)		4(1-11)		0.1498	4(1-10)		4(1-8)		0.7496
IES-R, distress symptoms										
Severity					0.408					0.2
Normal	42 (35.3%)	27.2-44.4	18 (34%)	22.4-47.8		14 (37.8%)	23.6-54.5	46 (34.1%)	26.5-42.6	
Mild	51 (42.9%)	34.2-52	18 (34%)	22.4-47.8		11 (29.7%)	17.1-46.5	58 (43%)	34.8-51.5	
Moderate	19 (16%)	10.4-23.8	14 (26.4%)	16.2-40		11 (29.7%)	17.1-46.5	22 (16.3%)	10.9-23.6	
Severe	7 (5.9%)	2.8-11.9	3 (5.7%)	1.8-16.4		1 (2.7%)	0.4-17.4	9 (6.7%)	3.5-12.4	
Score	13(7-22)		13(3-31)		0.8459	13(3-28)		13(6-23)		0.9896

(63.4%) and were single (81.4%) (*Table I*). 44.8%% of the health workers were nurses, 18.6% were physicians, and 14.5% were nursing assistants. 68.6% were working for less than 5 years. On average, each healthcare worker lives with three relatives/non-relatives. About 69.2% were living with their relative, while 21.5% were living together with their non-relative. More than one-third were living with relatives with comorbidities and only 2.9% were living with non-relative with comorbidities. Although 76.7% of healthcare workers had no comorbidities, the most common were asthma (8.1%), hypertension (7%) and other pre-existing conditions (5.2%). The respondents were also asked about the psychological support that they had received or availed and majority (79.7%) did not receive any psychological support. For those who received any support, the most common were psychological resources available through media (13.4%), psychological materials (4.7%), and counselling or therapy (4.7%). Knowledge about COVID19 was also measured among healthcare workers, and 70.9% had good knowledge on the disease.

Table VI. Severity of depression, anxiety and distress symptoms by living with a relative at home with comorbidities

Severity category	Living with relative					Living with relative with comordities				
	Yes	CI	No	CI	p-value	Yes	CI	No	CI	p-value
PHQ-9, depression symptoms										
Severity					0.004					0.007
None	51 (42.9%)	34.2-52	23 (43.4%)	30.6-57.1		20 (31.7%)	21.3-44.4	54 (49.5%)	40.2-58.9	
Mild	43 (36.1%)	27.9-45.2	12 (22.6%)	13.2-36		27 (42.9%)	31.1-55.5	28 (25.7%)	18.3-34.8	
Moderate	19 (16%)	10.4-23.8	5 (9.4%)	3.9-21		13 (20.6%)	12.3-32.6	11 (10.1%)	5.6-17.4	
Moderately severe	5 (4.2%)	1.7-9.8	10 (18.9%)	10.4-31.9		3 (4.8%)	1.5-14	12 (11%)	6.3-18.5	
Severe	1 (0.8%)	0.1-5.8	3 (5.7%)	1.8-16.4		(0%)	0-0	4 (3.7%)	1.4-9.5	
Score	6(2-9)		6(2-14)		0.1749	6(4-10)		5(1-9)		0.1614
GAD-7, anxiety										
Severity					0.089					0.009
None	63 (52.9%)	43.9-61.8	27 (50.9%)	37.5-64.2		25 (39.7%)	21.3-44.4	65 (59.6%)	40.2-58.9	
Mild	38 (31.9%)	24.1-40.9	10 (18.9%)	10.4-31.9		27 (42.9%)	31.1-55.5	21 (19.3%)	18.3-34.8	
Moderate	12 (10.1%)	5.8-17	10 (18.9%)	10.4-31.9		8 (12.7%)	12.3-32.6	14 (12.8%)	5.6-17.4	
Severe	6 (5%)	2.3-10.9	6 (11.3%)	5.1-23.2		3 (4.8%)	1.5-14	9 (8.3%)	6.3-18.5	
Score	4(0-7)		4(1-11)		0.1498	5(2-9)		3(0-7)		0.0959
IES-R, distress symptoms										
Severity					0.408					0.548
Normal	42 (35.3%)	27.2-44.4	18 (34%)	22.4-47.8		18 (28.6%)	21.3-44.4	42 (38.5%)	40.2-58.9	
Mild	51 (42.9%)	34.2-52	18 (34%)	22.4-47.8		29 (46%)	31.1-55.5	40 (36.7%)	18.3-34.8	
Moderate	19 (16%)	10.4-23.8	14 (26.4%)	16.2-40		12 (19%)	12.3-32.6	21 (19.3%)	5.6-17.4	
Severe	7 (5.9%)	2.8-11.9	3 (5.7%)	1.8-16.4		4 (6.3%)	1.5-14	6 (5.5%)	6.3-18.5	
Score	13(7-22)		13(3-31)		0.8459	16(7-26)		11(3-22)		0.0531

Prevalence of severity of depression, anxiety and distress symptoms. Tables II to VII show the prevalence and severity of depression, anxiety, and distress symptoms among the healthcare workers according to their age, sex, marital status, occupation, living with relative or non-relative at home, and knowledge on COVID-19. Prevalence of depression, anxiety and distress symptoms among all healthcare workers was 57%, 47.7%, 65.1%, respectively. Of the total (*Table II*), most had mild symptoms of depression (32%) and only 2.3% had severe symptoms of depression. 27.9% had mild symptoms of anxiety and 7% had severe symptoms of anxiety. 40.1% had mild symptoms of distress and 5.8% had severe symptoms distress.

Age. Across age groups (*Table II*), healthcare workers aged over 41 had no symptoms of depression (62.5%), and none had moderately severe or severe symptoms among those aged 31 and above. On the other hand, 13.8% and 3.7% of the those in age 20-30 had moderately severe and severe depression symptoms, respectively. Results also show that severity of depression symptoms significantly varies across age groups (*p=0.004*), and depression scores significantly decreases as age groups become older (*p=0.0001*).

Regarding anxiety symptoms, the percentage of no symptoms increases by age group. More young healthcare workers had moderate and severe symptoms compared to older age groups. Results also show that severity of anxiety symptoms significantly varies across age groups (*p=0.02*). Anxiety scores significantly differ among age groups, where scores decrease as age group increases (*p=0.0035*).

At least half of the healthcare workers aged 31 and above had mild distress symptoms, while higher proportion of young workers had moderate (23.9%) and severe distress symptoms (8.3%).

Sex. Prevalence of depression symptoms was higher among females (60.4%) than males (50.8%) (*Table III*). About the same proportion of males and females had mild and moderately severe depression symptoms, while more females had moderate and severe depression symptoms.

Although almost the same proportion of males (52.5%) and females (52.3%) had no anxiety symptoms, more males (32.8%) had mild anxiety symptoms while more females had moderate (15.3%) and severe anxiety symptoms (7.2%).

In terms of distress symptoms, more females experienced mild (45.1%) and severe (8.1%) symptoms while more males experienced moderate (23%) symptoms. Results show that severity of depression, anxiety and distress was not statistically significant among male and female.

Marital Status. Prevalence of depression symptoms was higher among singles than married healthcare workers (*Table III*). Although the same proportion between singles and married had mild depression symptoms, no married healthcare worker had moderately severe or severe depression symptoms. On the other hand, 10.7% and 2.9% of singles experienced moderately severe and severe depression symptoms.

Married healthcare workers had more mild anxiety symptoms, but more singles had moderate and severe anxiety symptoms.

In terms of distress symptoms, more than half of the married group had mild distress symptoms and 15.6% had moderate distress symptoms and no one had severe symptoms. On the other hand, at least one-third of the singles had mild, 20% had moderate and 7% had severe distress symptoms.

Results show that severity of depression, anxiety and distress was not statistically significant in terms of marital status.

Occupation. Among different types of occupation (*Table IV*), prevalence of depression symptoms was highest among therapists (cardiac and pulmonary) and technologists (medical and radiologic) (65.8%). Higher proportion of nursing assistants, therapists (cardiac and pulmonary), and technologists (medical and radiologic) experienced moderately severe and severe depression symptoms than physicians and nurses.

Prevalence of anxiety symptoms was again highest among therapists (cardiac and pulmonary), and technologist (medical and radiologic) (52.6%), and had moderate (21.1%) and severe (13.2%) symptoms.

The same pattern is also observed in terms of distress symptoms, where therapists (cardiac and pulmonary) and technologists (medical and radiologic) (73.7%) had the highest prevalence, and mostly had experienced mild (39.5%) and moderate (26.3%) symptoms.

Results show that severity of depression, anxiety and distress was not statistically significant between occupation (physicians, nurses, nursing assistants, cardiac/pulmonary therapists and medical/radiologic technologists).

Living with a relative or non-relative at home. A higher proportion of depression, anxiety and distress symptoms

was experienced by healthcare workers living with a relative as compared with non-relative at home (*Table V*). Higher proportion of those with living with a relative had mild symptoms of depression (36.1%). Results show that severity of depression symptoms varies according living with a relative at home (*p=0.004*).

Higher proportion of those with living with a relative have mild symptoms of anxiety (31.9%), but those living with non-relative have moderate symptoms of anxiety (21.6%).

Higher proportion of those with living with a relative have mild (42.9%) and severe (5.7%) symptoms of distress, but those living with non-relatives have moderate symptoms of anxiety (29.7%).

Living with a relative with comorbidities. A higher prevalence of depression, anxiety and distress symptoms was experienced by healthcare workers if the relative living at home have comorbidities (*Table VI*). Higher proportion of those with living with a relative with comorbidities have mild (42.9%), and moderate (20.6%) symptoms of depression. Results show that the severity of depression symptoms varies according to living with a relative at home with co-morbidities (*p=0.007*).

Higher proportion of those living with a relative with co-morbidities have mild (42.9%), or moderate (12.7%) symptoms of anxiety. Results show that severity of anxiety symptoms varies according living with a relative at home with comorbidities (*p=0.009*).

A higher proportion of those with living with a relative with co-morbidities have mild (46%), moderate (19%) or severe (6.3%) symptoms of distress.

Knowledge on COVID-19. Based on knowledge on COVID-19, higher prevalence of depression, anxiety and distress symptoms were experienced by healthcare workers with poor knowledge compared with those with good knowledge (*Table VII*). Higher proportion of those with poor knowledge had mild (46%) and moderately severe (14%) depression symptoms. On the other hand, higher proportion of those with good knowledge had moderate symptoms of depression (18%). Results show that severity of depression symptoms varies according to their knowledge on COVID-19 (*p=0.007*).

Healthcare workers with poor knowledge on COVID-19 had higher proportion of mild, moderate and severe anxiety symptoms. In addition, higher proportion of those with poor knowledge had mild and severe distress symptoms, while higher proportion of those with good knowledge had moderate distress symptoms.

Univariate and multivariate analysis of factors associated with depression, anxiety and distress. Tables VIII to X shows the association of demographic and clinical

Table VII. Severity of depression, anxiety and distress symptoms by knowledge on coronavirus disease (COVID-19)

Knowledge				
Poor	CI	Good	CI	p-value
PHQ-9, depression symptoms				
				0.007
17 (34%)	22.1-48.3	57 (46.7%)	38-55.7	
23 (46%)	32.6-60	32 (26.2%)	19.1-34.8	
2 (4%)	1-14.9	22 (18%)	12.1-26	
7 (14%)	6.7-26.8	8 (6.6%)	3.3-12.7	
1 (2%)	0.3-13.3	3 (2.5%)	0.8-7.4	
6.5 (3-9)		6 (2-10)		0.284
GAD-7, anxiety				
				0.678
23 (46%)	32.6-60	67 (54.9%)	45.9-63.6	
15 (30%)	18.8-44.2	33 (27.1%)	19.8-35.7	
8 (16%)	8.1-29.1	14 (11.5%)	6.9-18.5	
4 (8%)	3-19.7	8 (6.6%)	3.3-12.7	
5 (2-9)		4 (1-7)		0.2868
IES-R, distress symptoms				
				0.37
14 (28%)	17.2-42.2	46 (37.7%)	29.5-46.7	
24 (48%)	34.4-61.9	45 (36.9%)	28.7-45.9	
8 (16%)	8.1-29.1	25 (20.5%)	14.2-28.7	
4 (8%)	3-19.7	6 (4.9%)	2.2-10.6	
16 (7-23)		12.5 (5-25)		0.3365

Table VIII. Results of the binomial logistic regression analysis for depression symptoms using PHQ-9

PHQ-9, depression symptoms	Univariate Analysis		Multivariate Analysis	
	Crude Odds Ratio	p-value	Adjusted Odds Ratio	p-value
Occupation				
Physicians	1			
Nurses	1.484 (0.65-3.4)	0.351		
Nursing assistant	0.786 (0.27-2.25)	0.653		
Therapists/technologists	1.923 (0.73-5.04)	0.184		
Age group				
20-30	1			
31-40	0.343 (0.16-0.73)	0.005*	0.278 (0.11-0.72)	0.008
41-50	0.296 (0.12-0.74)	0.009*	0.273 (0.12-0.61)	0.002
Sex				
Male	1			
Female	1.474 (0.79-2.77)	0.228		
Marital Status				
Single	1			
Married	1.929 (0.89-4.19)	0.097		
Years in practice				
<5years	1			
5-20 years	0.74 (0.34-1.61)	0.448		
>20years	0.308 (0.12-0.82)	0.019*		
Number of people living with you	1.056 (0.94-1.19)	0.379		
Living with relative	1.022 (0.53-1.96)	0.947		
Living with non-relative	0.989 (0.47-2.06)	0.976		
Living with relative with comorbidities	2.131 (1.12-4.04)	0.02*	2.731 (1.36-5.5)	0.005
Living with non-relative with comorbidities	0.493 (0.08-3.03)	0.445		
Comorbidities				
Diabetes mellitus	0.75 (0.1-5.45)	0.776		
Hypertension	0.515 (0.16-1.69)	0.274		
Asthma	5.023 (1.09-23.18)	0.039*		
Other cardiovascular conditions	0.753 (0.05-12.23)	0.842		
Other preexisting conditions	1.543 (0.37-6.39)	0.549		
None	0.646 (0.31-1.35)	0.244		
Psychological support				
Psychological materials	1.272 (0.29-5.5)	0.747		
Psychological resources available through media	0.979 (0.4-2.37)	0.962		
Counselling or therapy	5.615 (0.68-46.68)	0.11		
None	0.736 (0.34-1.58)	0.432		
Knowledge				
Poor	1			
Good	0.587 (0.3-1.17)	0.128		

factors, psychological services availed and knowledge on COVID-19 with prevalence of depression, anxiety and distress symptoms using univariate and multivariate binomial logistic regression model.

Depression symptoms. Univariate analysis in *Table VIII* shows that age categories, years of experience, living with relatives with comorbidities, and those with asthma are significantly associated with prevalence of depression symptoms.

Twenty variables including demographic and clinical factors, psychological support and knowledge on COVID-19 were assessed using stepwise logistic regression (backward selection) to determine the significant predictors of depression symptoms.

After multivariate analysis, only age group and living with relative with comorbidities have statistically significant association with prevalence of depression symptoms. Taking these into account, the adjusted odds ratio shows that healthcare workers aged 31-40 years and 41 years and above are 70% less likely to have depression symptoms (OR=0.278, CI 95%, 0.11-0.72 *p=0.008* and

OR=0.273, CI 95%, 0.12-0.61, *p=0.002*, respectively) compared to younger health workers between 20 and 30 years old. Those living with relatives with comorbidities are 2.7 times more likely to experience depression symptoms (OR=2.731, CI 95%, 1.36-5.5, *p=0.005*).

The results also showed that therapists (cardiac and medical)/technologists (pulmonary and radiologic) and nurses are 1.92 times and 1.48 times more likely to develop symptoms of depression as compared to other occupation respectively; females are 1.47 times more likely to develop symptoms of depression as compared to males; married healthcare workers are 1.92 times more likely to develop symptoms of depression as compared to single; asthmatics are 5.02 times more likely to develop symptoms of depression; those who received psychological support are more likely to develop symptoms of depression. However, these are not statistically significant.

Healthcare workers with more than 5-20 years of practice and >20 years of practice are 26% and 69.2%, respectively, less likely to develop symptoms of

Table IX. Results of the binomial logistic regression analysis for anxiety symptoms using GAD-7

GAD-7, anxiety symptoms	Univariate Analysis		Multivariate Analysis	
	Crude Odds Ratio	p-value	Adjusted Odds ratio (CI)	p-value
Occupation				
Physicians	1			
Nurses	1.5 (0.65-3.46)	0.341		
Nursing assistant	0.974 (0.34-2.83)	0.962		
Therapists/technologists	1.624 (0.63-4.2)	0.317		
Age group				
20-30				
31-40	0.298 (0.13-0.66)	*0.003*	0.212 (0.09-0.5)	*<0.001*
41-50	0.455 (0.18-1.13)	0.089	0.37 (0.14-0.98)	*0.045*
Sex				
Male	1			
Female	1.008 (0.54-1.88)	0.979		
Marital Status				
Single	1			
Married	1.214 (0.56-2.63)	0.623		
Years in practice				
<5years				
5-20 years	1.329 (0.61-2.88)	0.472		
>20years	0.681 (0.26-1.77)	0.43		
Number of people living with you	1.028 (0.91-1.16)	0.651		
Living with relative	0.923 (0.48-1.76)	0.809		
Living with non-relative	0.915 (0.44-1.9)	0.812		
Living with relative with comorbidities	2.273 (1.22-4.23)	*0.01*	2.889 (1.46-5.73)	*0.002*
Living with non-relative with comorbidities	0.725 (0.12-4.45)	0.728		
Comorbidities				
Diabetes mellitus	1.1 (0.15-7.99)	0.925		
Hypertension	0.77 (0.23-2.53)	0.666		
Asthma	1.514 (0.5-4.56)	0.462		
Other cardiovascular conditions	1.099 (0.07-17.86)	0.947		
Other preexisting conditions	1.396 (0.36-5.39)	0.628		
None	0.682 (0.33-1.39)	0.291		
Psychological support				
Psychological materials	3.474 (0.68-17.72)	0.134		
Psychological resources available through media	1.007 (0.42-2.43)	0.988		
Counselling or therapy	1.883 (0.44-8.14)	0.397		
Others	3.38 (0.34-33.15)	0.296		
None	0.828 (0.39-1.74)	0.619		
Knowledge				
Poor	1			
Good	0.699 (0.36-1.35)	0.289		

depression as compared to those with <5years of practice. Healthcare workers with good knowledge of COVID-19 are 41.3% are less likely to have symptoms of depression. However, these are not statistically significant.

Anxiety symptoms. Univariate analysis in *Table IX* shows that age categories and living with relatives with comorbidities are significantly associated with prevalence of anxiety symptoms.

Twenty variables including demographic and clinical factors, psychological support and knowledge on COVID-19 were assessed using stepwise logistic regression (backward selection) to determine the significant predictors of anxiety symptoms.

After multivariate analysis, age group and living with a relative with co-morbidities were found to be statistically associated with prevalence of anxiety symptoms. Considering both of these variables, the adjusted odds ratios show that healthcare workers age 31-40 years are 80% less likely to experience anxiety symptoms (OR=0.212, CI 95%, 0.09-0.5, *p<0.001*), and those aged

≥41 years are 73% less likely to have anxiety symptoms (OR=0.37, CI 95%, 0.14-0.98, *p<0.045*). Those living with relatives with comorbidities are 2.9 times more likely to have anxiety symptoms (OR=2.889, CI 95%, 1.46-5.73, *p=0.002*).

The results also showed that therapists (cardiac and medical technologists - pulmonary and radiologic) and nurses are 1.92 times and 1.48 times more likely to develop symptoms of anxiety, respectively. Females are 1.47 times more likely to develop symptoms of anxiety as compared to males. Married healthcare workers are 1.92 times more likely to develop symptoms of anxiety as compared to single. Asthmatic healthcare workers are 5.02 times more likely to develop symptoms of anxiety. And, finally, those who received psychological support are more likely to develop symptoms of anxiety. However, these are all not statistically significant.

Healthcare workers with good knowledge are 30.1% less likely to have symptoms of anxiety but this is not statistically significant.

Distress symptoms. Univariate analysis in Table X shows no factor which is significantly associated with prevalence of distress symptoms.

The results also showed that therapists (cardiac and medical)/technologists (pulmonary radiologic), nursing assistant and nurses are 2.18, 2 and 1.29 times more likely to develop symptoms of distress respectively; females are 1.88 times more likely to develop symptoms of distress as compared to males; age group >41 years are 1.25 times more likely to develop symptoms of distress as compared to younger age group; health care workers with >20years of practice are 1.77 times more like to develop symptoms of distress; asthmatic and hypertensive healthcare workers are 3.48 and 1.66 times more likely to develop symptoms of distress; healthcare workers with family members with comorbidities are 1.59 times more likely to develop symptoms of distress; those who received psychological support are more likely to develop symptoms of anxiety. However, these are all not statistically significant.

Married healthcare workers are 18.2% less like to develop symptoms of distress as compared to singles; healthcare workers with good knowledge are 35.7%less likely to have symptoms of distress. However, these are not statistically significant.

Discussion

This is a cross sectional study that involves 172 healthcare workers with direct contact to patients with COVID-19 at the Cardinal Santos Medical Center. Overall, 57%, 47.7%, and 65.1% of healthcare workers reported symptoms of depression, anxiety and distress, respectively. Several studies showed similar results on mental health outcome of healthcare workers during severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreak, as well as during the current COVID-19 pandemic.[6-8,12,13] Healthcare workers are not only under stress during pandemics, but they may also suffer psychologically long after the initial outbreak is over.[40]

Age and living with a family with comorbidities were significantly associated with prevalence of depression and anxiety among healthcare workers after multivariate analysis.

Results of this research showed healthcare workers >30 years old are less likely to have symptoms of depression and anxiety as compared to younger healthcare workers (aged 21-30 years old). Younger individuals experience more adverse psychological symptoms during a pandemic as described by several studies of Ahmed et al., Gao et al., and Huang and Zhao.[35-37] This finding may in part be due to their caregiving role in families, who provide financial and emotional support to children or the elderly. In addition, the nature of their job during the COVID-19 pandemic among this age group could be particularly stressful.[38]

Healthcare workers living with relative/s with comorbidities are more likely to have symptoms of depression and anxiety. Safety from infection was the main concern as they worried most that they might infect

Table X.   Results of the binomial logistic regression analysis for distress symptoms using IES-R

IES-R, distress symptoms	Univariate Analysis	
	Crude Odds Ratio	p-value
Occupation		
Physicians	1	
Nurses	1.287 (0.56-2.97)	0.554
Nursing assistant	2 (0.65-6.12)	0.224
Therapists/technologists	2.178 (0.8-5.95)	0.129
Age group		
20-30	1	
31-40	0.739 (0.35-1.57)	0.429
41-50	1.248 (0.48-3.28)	0.653
Sex		
Male	1	
Female	1.877 (0.98-3.59)	0.057
Marital Status		
Single	1	
Married	0.818 (0.36-1.86)	0.633
Years in practice		
<5years	1	
5-20 years	0.85 (0.38-1.88)	0.689
>20years	1.768 (0.61-5.17)	0.298
Number of people living with you	1.037 (0.91-1.18)	0.57
Living with relative	0.943 (0.48-1.86)	0.866
Living with non-relative	0.849 (0.4-1.8)	0.671
Living with relative with comorbidities	1.593 (0.83-3.07)	0.164
Living with non-relative with comorbidities	0.798 (0.13-4.91)	0.808
Comorbidities		
Diabetes mellitus	0.527 (0.07-3.84)	0.528
Hypertension	1.66 (0.43-6.38)	0.46
Asthma	3.48 (0.75-16.1)	0.111
Other preexisting conditions	1.933 (0.39-9.61)	0.42
None	0.547 (0.25-1.21)	0.138
Psychological support		
Psychological materials	0.519 (0.12-2.15)	0.366
Psychological resources available through media	1.262 (0.49-3.26)	0.631
Counselling or therapy	3.933 (0.47-32.75)	0.205
Others		
None	0.823 (0.37-1.82)	0.631
Knowledge		
Poor	1	
Good	0.643 (0.31-1.32)	0.227

their families with COVID-19.[39-41] Older people and people with pre-existing medical conditions (such as diabetes, heart disease, preexisting heart condition, chronic obstructive lung disease, asthma) appear to be more vulnerable to becoming severely ill with the COVID-19. Cai., et al., cited the most important factor that helped ease the stress of the medical staff was when their family was well, not infected with COVID-19, and were not believed to be at risk of infection. Hence, reassurance of personal safety as well as providing psychological support for medical staff might be key to encourage healthcare workers to continue working during the pandemic.[36]

Level of knowledge on COVID-19 among health care workers significantly differs across severity of depression. Health care workers with good knowledge are 41% less likely to have depression symptoms compared to those with poor knowledge. However, there is no statistically significant association between knowledge and with prevalence of depression symptoms after binomial regression logistic analysis. Knowledge of a disease may

influence healthcare workers' attitudes and practices. There are limited studies that correlated mental health outcome with knowledge.[14] A study by Amin, F., et al. showed that low-to-moderate knowledge on COIVD-19 of frontline doctor was associated with depression on multivariate analysis.[42] Awareness of the effects of disease prevention measures with reduced numbers of reported cases reduced staff stress.[39]

Sex was not identified as a statistically significant risk factor in this study, which is similar to the study of Huang, et al and Amin, et al.[34,39] These results were different from Lao, et al. and Gao, et al. which showed female sex affecting mental health outcome.[12,13]

Occupation was not a statistically significant risk factor, though various studies identified nurses to be more at risk for developing symptoms of depression and anxiety.[12,39,41]

Marital status, presence of comorbidities, years in practice, receiving psychological support were also not statistically significant factors to mental health outcomes in this study.

No variable has significant association with distress symptoms. Likewise, the stepwise logistic regression (backward selection) has not identified any significant predictors of distress symptoms.

Conclusion and Recommendations

Healthcare workers are at risk not only from physical exhaustion, but also from emotional strain brought about by this pandemic. This will cause adverse outcomes not only for individual well-being, but also for patient care and the healthcare system.

Cognizant of high rates of depression, anxiety and distress among our younger health care workers living with relatives with comorbidities during this time will be a challenge to both hospital management and the government to establish and/or improve existing programs to promote mental wellbeing and address their mental health needs. These programs should be readily available and accessible to healthcare workers seeking psychological support. Psychological stress can accumulate over time and have an impact later in the outbreak, including posttraumatic stress disorder (PTSD), which should be investigated in future studies.

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