Electronic Journal of General Medicine
2022, 19(5), em389
e-ISSN: 2516-3507
https://www.ejgm.co.uk/

MODESTUM

Original Article

OPEN ACCESS

Can living with COVID-19 patients in a hospital increase anxiety levels? A survey-based single-center study in Peru

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Citation: Moya-Salazar J, Saciga-Saavedra W, Cañari B, Chicoma-Flores K, Contreras-Pulache H. Can living with COVID-19 patients in a hospital increase anxiety levels? A survey-based single-center study in Peru. Electron J Gen Med. 2022;19(5):em389. https://doi.org/10.29333/ejgm/12140

ARTICLE INFO

Received: 22 Dec. 2021

Accepted: 25 Feb. 2022

ABSTRACT

Introduction: Anxiety can affect front-line healthcare workers (HCWs) during the COVID-19 pandemic mainly in settings with influencing factors. Living with COVID-19 patients in hospital settings could affect mental health during lockdown. The present study aimed to estimate the anxiety levels of HCWs of the care center for COVID-19 Villa Panamericana during the first outbreak of COVID-19 in Peru.

Methods: This is a descriptive and correlational study. Ninety-six HCWs were enrolled in this study (mean age 30±5.6 years). The care center for COVID-19 Villa Panamericana houses COVID-19 patients and HCWs in the same environment. We used the 14-item Hamilton anxiety rating scale questionnaire. Professionals were interviewed directly at the VP-19 rest towers. SPSS V.23 were used to analyze the data.

Results: Fifty-four (56.3%) were male and the most frequent age group was 26-35 years (81.3%). Thirty-nine (40.6%) were nurses, 28 (29.2%) were nursing technicians, 15 (15.6%) were physicians, and 14 (14.6%) were medical technologists. Of the total, 66 (68.8%) HCWs had a mild level of anxiety, while 6 (6.3%) had severe anxiety. Medical technologists and nursing technicians had the highest level of severe anxiety (14.3% and 7.1%), while nurses had the highest level of mild anxiety (76.9%). We report that 32 (33.3%) HCWs had COVID-19 while 93.7% had symptoms of anxiety [3(9.4%) mild to moderate, 21(65.6 %) moderate to severe, and 6(18.8%) severe]. We found a significant difference in anxiety levels between HCWs with and without COVID-19 (p=0.001).

Conclusions: Levels of moderate and severe anxiety significantly increased in HCWs infected with COVID-19 during their coexistence with COVID-19 patients in the health center that houses both at the same time.

Keywords: anxiety, health professionals, COVID-19, Peru, mental health, SARS-CoV-2

INTRODUCTION

The psychosocial aspects of the world's population have been hit hard by the spread of COVID-19 since January 2020. In an unprecedented development, this infectious disease has managed to shake up social institutions and interfere with daily life at all levels, strata, and dimensions [1]. The rapid increase in infections and deaths has led to an immediate response from health systems to curb the threats of COVID-19. Health professionals have been enlisted and deployed at different levels of care to achieve those goals [2,3]. Several countries threatened by COVID-19 have targeted their intervention strategies on loosely structured and organized health plans with varying success in containing COVID-19 [4].

Peru, a middle-income country with 33 million inhabitants, has been beaten hard by COVID-19. When declaring a lockdown in March 2020, has converted a high-performance athletes' accommodation center (used for the Pan American Games Lima 2019) into a hospitalization and care center for COVID-19 (Villa Panamericana 2019) unique in the world as its hosted patients and health professionals [5]. With check-in and check-out controls, healthcare professionals (HCWs) were housed for half a month in the Villa Panamericana (VP-19), working continuous hours and resting periods in residential towers set up in front of the COVID-19 inpatient and monitoring centre.

HCWs have frequently manifested neuropsychological disorders during the pandemic, being anxiety the most frequent and most linked to fear, poor life quality, and depression [6,7]. This frequency of anxiety has been estimated in HCWs with daily work schedules and without institutionalization in specialized COVID-19 centres [8]. There is a possibility that providing medical care within a continuous, demanding, and strenuous schedule and sharing the same space during respite has a dramatic impact on HCWs' anxiety levels. It is also possible that this anxiety can be related to some

professional characteristics such as length of service, type of profession, and age group.

This study aimed to estimate the anxiety levels of VP-19's HCWs and associate them to demographic, professional and epidemiological characteristics during the first outbreak of COVID-19 in Peru.

MATERIALS AND METHODS

Study Design and Location

This is a cross-sectional study conducted at VP-19 during the first wave of the COVID-19 pandemic. VP-19 is the only clinic in the world where patients with COVID-19 and front-line HCWs were admitted. This center is part of the social security (EsSalud), and its equipment is for comprehensive and specialized care of COVID-19 patients.

During the first quarantine, patients reported by telephone with symptoms and a positive home diagnosis of COVID-19 were transferred to VP-19 to be treated, hospitalized and housed until their rehabilitation. This center houses around 150 HCWs (doctors, nurses, medical technologists, health technicians, and administrative staff) who serve a fortnight's continuous work period, and SARS-CoV-2 screening infection during admission and departure.

Participants, Inclusion Criteria, and Stay in VP -19

Ninety-six HCWs were enrolled in this study. Inclusion criteria were: front-line HCWs of both sexes, aged 18-60 years, working at least one month at VP-19 and willingness to participate in the study. Each HCW spent 15 days working at VP-19 on a continuous schedule of 12 hours per day (and 24 hours depending on the function) also was housed in one of the housing towers set up for the workers. Admission and departure screenings were done with molecular (conventional reverse transcriptase-polymerase chain reaction-RT-PCR) and serological testing for IgG/IgM (SafeCare Biotech, Hangzhou, China) for COVID-19 [5].

Survey and Data Collection

This study used the 14-item Hamilton anxiety rating scale (HAR-S) questionnaire [10]. Two specialized professionals surveyed the HCWs during their off-hours to determine the psychic and somatic anxiety levels. HAR-S translated into Spanish was used and showed good internal consistency (Cronbach's alpha: 0.89) [11].

HAR-S is scored from 0 (anxiety not present) to 4 (severe anxiety) with a maximum score of 56 points. In addition, a score <17 indicates mild anxiety, 18-24 mild to moderate anxiety, 25-30 moderate to severe anxiety, and ≥31 points indicate severe anxiety. Each participant signed informed consent before each survey. The time per survey was 15 minutes per participant approximately. Professionals were interviewed directly at the VP-19 rest towers.

Data Analysis

Both demographic and anxiety data were coded in a data matrix in SPSS v23.0 (IBM Armonk, USA) for Windows. Initial data analysis was developed with descriptive statistics after verification of normality of the data with the Kolgomorov-Skirrow test. A Spearman correlation test, paired t-test and one-way ANOVA were performed considering a 95% confidence interval and a p-value <0.05 as significant.

Table 1. Baseline characteristics of the healthcare workers of the Pan American Park in Lima, Peru

Characteristics	N	%
Age group (years)		
≤25	8	8.30
26-35	78	81.3
≥36	10	10.4
Gender		
Female	42	43.8
Male	54	56.3
Profession		
Physician	15	15.6
Nurse	39	40.6
Medical technologist	14	14.6
Nurse technician	28	29.2
Length of service		
≤2	23	24.0
3 a 5	61	63.5
≥6	12	12.5
Place of origin		
Lima	84	87.5
Province	12	12.5
COVID-19	32	33.3

Ethical Considerations

We respect the HCWs' decision to participate in the study in compliance with the guidelines of the Helsinki declaration. The Ethics Committee of Norbert Wiener University approved this study (approval ID: UNW-N°0102-2020).

RESULTS

The median age of the 96 participants enrolled in the study was 30±5.6 years. Fifty-four (56.3%) were male. The most frequent age group was 26-35 years (n=78, 81.3%). Of total, 89 (92.7%) HCWs lived in the city of Lima. Regarding the HCWs, 39 (40.6%) were nurses, 28 (29.2%) were nursing technicians, 15 (15.6%) were physicians, and 14 (14.6%) were medical technologists.

The most frequent length of service was 3-5 years in 61 (63.5%) professionals, followed by 23 (24%) professionals with less than two years of service (**Table 1**). We found a positive correlation between the gender of HCWs with age (p=0.026), and SARS-CoV-2 infection with age (p=0.046).

Of the total, 66 (68.8%) HCWs had a mild level of anxiety, while 6 (6.3%) had severe anxiety. Severe anxiety was mainly present in those under 25 years of age (38.5%) and affected males and females equally (**Table 2**). We found a positive correlation between anxiety levels and COVID-19 infection (p=0.0001).

Among professions, medical technologists and nursing technicians had the highest level of severe anxiety (14.3% and 7.1%), while nurses had the highest level of mild anxiety (76.9%). When determining anxiety symptoms according to length of service (3-5 years vs. ≥6 years), we observed 3 (4.9%) vs. 2 (16.7%) HCWs for severe anxiety (p=0.474) and 16 (26.2%) vs. 1 (8.3%) HCWs for moderate to severe anxiety (p=0.404), respectively. Also, moderate to severe anxiety was more frequent in HCWs from the provinces (30.8%) than the HCWs

Table 2. Anxiety levels in healthcare workers of the Peruvian Pan American Park during the COVID-19, 2020

Characteristics	Anxiety (HAR-S)				p-value
	Mild	Mild to moderate	Moderate to severe	Severe	
COVID-19	66 (68.8)	3 (3.1)	21 (21.9)	6 (6.3)	0.001
Age group (years)					
≤25	7 (53.8)	0 (0)	1 (7.7)	5 (38.5)	0.643
26-35	55 (74.3)	2 (2.7)	16 (21.6)	1 (1.4)	
≥36	4 (44.4)	1 (11.1)	4 (44.4)	0 (0)	
Gender					
Female	28(66.7)	2 (4.8)	9 (21.4)	3 (7.1)	0.572
Male	38(70.4)	1 (1.9)	12 (22.2)	3 (5.6)	
Profession					
Physician	12 (80)	1 (6.7)	1 (6.7)	1 (6.7)	0.064
Nurse	30 (76.9)	1 (2.6)	7 (17.9)	1 (2.6)	
Medical technologist	8 (57.1)	0 (0)	4 (28.6)	2 (14.3)	
Nurse technician	16 (57.1)	1 (3.6)	9 (32.1)	2 (7.1)	
Length of service					
≤2	18 (78.3)	0 (0)	4 (17.4)	1 (4.3)	0.404
3-5	39 (63.9)	3 (4.9)	16 (26.2)	3 (4.9)	
≥6	9 (75)	0 (0)	1 (8.3)	2 (16.7)	
Place of origin					
Lima	58 (69.9	2 (2.4)	17 (20.5)	6 (7.2)	0.929
Province	8 (61.5)	1 (7.7)	4 (30.8)	0 (0)	

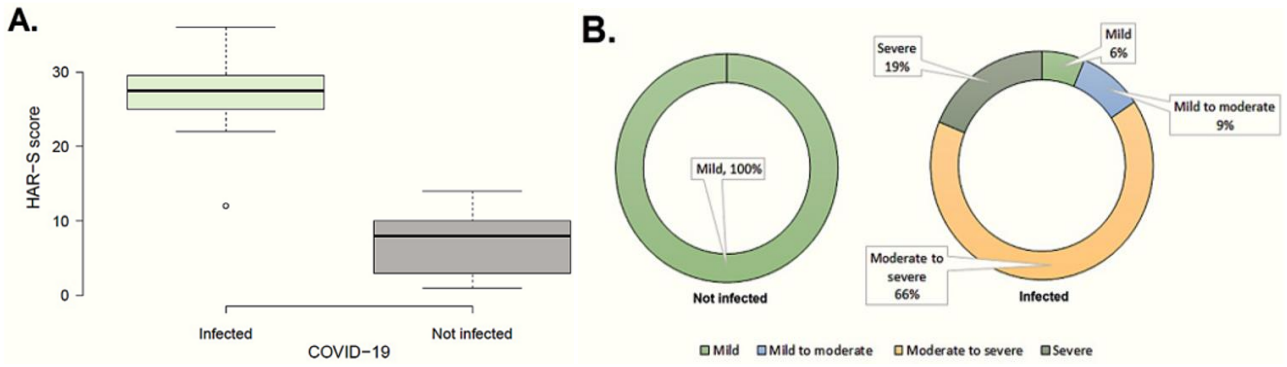

Figure 1. Characteristics of healthcare workers infected & not infected with SARS-CoV-2 in Peru. **A.** Distribution of anxiety scores (HAR-S). **B.** Anxiety levels between both groups showing increase in anxiety in professionals with COVID-19 infection

from Lima, although the latter were the only ones to present severe depressive symptoms (7.2%).

In this study, we report that 32 (33.3%) HCWs had COVID-19 during their work at VP-19. Of the HCWs who had COVID-19, 93.7% had symptoms of anxiety [3 (9.4%) mild to moderate, 21 (65.6 %) moderate to severe, and 6 (18.8%) severe]. We found a significant difference in anxiety levels between HCWs with and without COVID-19 (p=0.001) (**Figure 1**).

The mean age of those infected was 31.7±5.8 (95% CI 29.7 to 33.8), mainly male (56.3%) and working 3-5 hours (71.9%). Of these, 12 (37.5%) were nursing technicians, 9 (28.1%) were nurses, and 7 (21.9%) were medical technologists. Length of service was correlated with gender and age (p=0.002) but not with anxiety levels (p=0.286) or SARS-CoV-2 infection (p=0.154).

Twenty-four (75%) HCWs had symptoms of COVID-19 pneumonia, but only two (6.3%) required treatment. Symptoms of moderate to severe and severe anxiety affected 21 (65.6%) and 6 (18.8%) HCWs, respectively (**Table 3**). We found no difference in anxiety levels between symptomatic and asymptomatic patients (p=0.962). Although, we observed a higher frequency of symptomatic patients with moderate to severe anxiety levels (70.8%) and a higher frequency of asymptomatic patients with severe anxiety (25%).

DISCUSSION

This study evidences that VP-19 HCWs infected by SARS-CoV-2 during the first COVID-19 epidemic in Peru presented moderate to severe anxiety levels. In addition, young adult (26-35 years) and males were most affected, while the length of service and profession did not correlate with anxiety levels.

The main strength of this research was that this is the first study in Peru conducted at VP-19 to estimate anxiety levels in HCWs. This centre is unique in the world in admitting patients with COVID-19 and HCWs, our results show the impact on anxiety levels in this type of healthcare system during the workflow. Another strength of the study is the simultaneous assessment of HCWs with and without SARS-CoV-2 infection showing differences in anxiety levels between the two groups.

Anxiety is at the forefront of mental disorders that have globally affected around 21% of the world's population. These anxiety levels may have increased during the pandemic due to the confinement and uncertainty brought about by COVID-19, with around 76.2 million people experiencing anxiety disorders in 2020 [12]. These neuropsychological effects are possibly more pronounced in front-line HCWs because they have experienced significantly higher anxiety levels due to high

Table 3. Anxiety levels in healthcare workers of the Pan-American Park infected by SARS-CoV-2 during the first wave of COVID-19 in Peru

Characteristics	Anxiety (HAR-S)				p-value
	Mild	Mild to moderate	Moderate to severe	Severe	
COVID-19	2 (6.3)	3 (9.4)	21 (65.6)	6 (18.8)	0.001
Symptoms					
Asymptomatic	1 (12.5)	1 (12.5)	4 (50)	2 (25)	0.962
Symptomatic*	1 (4.2)	2 (8.3)	17 (70.8)	4 (16.7)	
Treatment					
None	1 (3.2)	3 (9.4)	21 (65.6)	6 (18.8)	0.804
Symptomatic**	2 (6.3)	0 (0)	0 (0)	0 (0)	

Note. *Includes mild and moderate symptoms; **Symptomatic treatment included management of fever, headache, cough, & nausea; MADR-S: Montgomery-Asberg depression rating scale; COVID-19: Coronavirus disease 2019

patient loads, extended and continuous schedules, lack of resources and daily coping with fear, death and pain [13,14].

Anxiety begins with fear (panic and distress) and worry (anxious sadness and aggressive expectancy) that interferes with daily activities in a daily cycle [15]. Using HAR-S, this study determined that 31.2% of HCWs had mild to moderate/severe anxiety symptoms, similar to the 37% reported in [16] in 421 Spanish HCWs. However, it was lower than the frequency reported in [17] in 531 Colombian physicians (72.9%). In this regard, a possible explanation why the anxiety frequency was higher in [17] is the type of population because the present study only evaluated general practitioners and specialists, so when other professionals take part, anxiety levels may change. In other words, anxiety is perceived differently by each professional group.

A cross-sectional study in HCWs in Egypt [18] has shown that 90.5% of them presented different degrees of anxiety (32% and 18.5% presented moderate and severe anxiety symptoms, respectively). Also, the study [19] in Saudi Arabia showed a level of moderate anxiety of 28.9% and severe anxiety of 27.5% in HCWs coinciding with our results. Another study in 152 HCWs from Ecuador showed high levels of anxiety and fear due to COVID-19 [20]. On the other hand, the prevalence of anxiety in HCWs in Brazil was 46.2%, in Jordanian HCWs, 60% presented severe anxiety symptoms, and in HCWs from Iran, moderate and severe anxiety was 65.6% [21,22]. The different prevalence of anxiety in HCWs are conditioned to the moment of the assessment (due most studies are cross-sectional), the number of daily infections and deaths, family conditions (i.e., living with an elderly or chronically ill family member), the level of response to COVID-19 (i.e., available beds, PPE, mechanical ventilation equipment), and the landscape of socio-economic crises of each population.

Anxiety often leads to depression resulting in a mixed anxious-depressive disorder. Several studies evaluated and associated both neuropsychiatric disorders in HCWs [6,7,13,14, 16,18,21,22]. The HCWs from VP-19 who presented higher anxiety levels have also reported moderate levels of depression during the first outbreak of COVID-19 in Peru [5]. As anxiety may be associated with frequent depression, longitudinal studies are needed to understand its relationship (as well as its relationship with other psychological outcomes such as fear or stress). The moderate and high prevalence of anxiety in HCWs can block an adequate response in daily life function, can lead to adaptive and depressive disorders, particularly in HCWs who have lost family members with COVID-19 and who still experience high levels of fear. During the pandemic, increased fear levels due to COVID-19 have been reported in all regions [23]. Communities with low settings were the most affected. In addition, an environment of economic, health, political and social crisis such as Latin America may lead to increased concerns during the COVID-19 lockdown and the prioritization of work and income over health. We recently demonstrated a bit of fear of COVID-19 in Latin American populations [24], where high anxiety levels have been reported [12]. It is possible that in the general population, these levels of fear may have led to some risk behaviours during restraints, while in HCWs it may have impacted their work performance and other dimensions of quality of life [7].

In this context where anxiety takes part in daily life, HCWs have been affected by various disorders even before the pandemic [25-27], so there may be differences according to the profession and healthcare role. Our results showed no differences between occupations. However, medical technologists and physicians experienced more frequently severe anxiety, while nursing technicians had higher levels from mild to moderate. The systematic review by Fernandez et al. [28] has shown that the prevalence of anxiety was slightly lower in physicians compared with nurses. On the other hand, the study [27] in physicians in Colombia has estimated a prevalence of anxiety of 72.9%. Also, the research in [6] in Iran found that the predominance of anxiety was significantly higher in doctors and nurses compared with other professionals. While these studies indicate a different prevalence in doctors and nurses, our results only showed a prevalence of moderate to severe anxiety in 12.6% and 20.5% of doctors and nurses, respectively.

Interestingly, the front-line medical technologist (42.9%) and nurse technician (39.2%) in VP-19 had the highest prevalence of anxiety during the first outbreak of COVID-19 in Peru. These high levels of anxiety in these professionals may be due to contact with COVID-19 patients. For that reason, anxiety increases significantly [14,16], although the study [29] has shown that the 27.7% anxiety reported in HCWs was not remarkably higher than in the general population. It is appropriate to investigate further the causes of high anxiety levels in these professions.

On the other hand, in this study, we observed an increase from moderate to severe anxiety in females against males with 28.5% and 27.8%, respectively. In the general population, higher levels of anxiety have been demonstrated in women [12,30] as well as during the pandemic female HCWs had the highest levels of anxiety symptoms [6,16,21,22].

Another important finding of this study was that only patients with COVID-19 infection had anxiety. In contrast to depression in VP-19 HCWs [5], anxiety symptoms were significantly more severe in HCWs infected with SARS-CoV-2. In this regard, reports mention that HCWs who have been in

contact with SARS-CoV-2 infected people have shown higher anxiety levels, stress and insomnia [16].

In addition, the HCWs who provided care for patients who had tested positive for COVID-19 reported higher levels of fear, depression, anxiety, and stress [22]. In our study, nursing technicians, nurses, and medical technologists experienced higher levels of moderate anxiety. That is due to frequent contact with COVID-19 patients and their biological samples, leading to a possible contagion towards family and friends, a sudden state of worry and distress about the consequences of having COVID-19. Numerous HCWs have moved away from home to avoid infecting family members, self-isolating, restricting their mobility, leading to anxiety and depression.

Anxiety is often reflected in fear and also anger. It also lowers frustration tolerance leading to reduced quality of care and less empathy. Many physicians from different specialities have ended up working in COVID-19 areas without prior preparation. While this may be a determinant for the development of anxiety and depression, VP-19's unique working environment and system may also be essential. The VP-19 HCWs worked on a fortnightly basis with the COVID-19 patients and lived with the deaths and mourning, restricted in their housing breaks. Mobility restriction during the pandemic, contact with COVID-19 patients and the rise of cases and deaths that impact the quality of life have been interrelated to increased anxiety levels [12,21,22,31,32]. Thus, it is necessary to assess anxiety for six months to know whether it is a generalized anxiety disorder that has been prevalent in HCWs during the pandemic or if it is a mixed disorder, as anxiety can spill over, provoke suicide and require treatment.

Despite the originality of this study and its meaningful findings, there were some limitations. This cross-sectional study did not allow monitoring anxiety levels of HCWs in each outbreak of COVID-19 in Peru. Second, the sample size does not allow extrapolation of data between hospitals and regions; indeed, cultural and economic differences may alter anxiety levels in HCWs in the Peruvian Andes and Amazon. Third, VP-19 is a unique care centre in the region where HCWs confine for 15 days at the work where patients with COVID-19 are hospitalized. Therefore, its generalizability is not extensive. Finally, lockdown did not allow the exploration of other occupational, social and economic factors of the participants. As the information on the mental health of VP-19 HCWs was not available yet, this study contributes to the discussion on anxiety levels, as from our findings, HCWs infected with COVID-19 can be prioritized and followed up post-COVID-19.

In conclusion, levels of moderate and severe anxiety significantly increased in HCWs infected with COVID-19. Anxiety symptoms were more frequent in females and by profession in Nurse technicians, nurses and medical technologists. It is necessary from a bio-psychosocial approach that VP-19's HCWs have adequate follow-up and therapies within a specific program to prevent the sequelae of anxiety in the HCWs' daily lives while continuing to struggle with the COVID-19 pandemic.

Author contributions: JMS: provided the study concept and design, statistical analysis, data management, and wrote the manuscript; **WSS:** provided the study concept, data acquisition, data curation, and wrote the manuscript; **BC:** provided the data curation, formal analysis, and performed data management and interpretation; **KCF:** provided the data management and wrote the manuscript; and **HCP:** provided the study concept, data analysis, and interpretation. All authors have agreed with the results and conclusions.

Funding: No funding source is reported for this study.

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding authors.

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