

Intensive care unit professionals during the COVID-19 pandemic in Spain: social and work-related variables, COVID-19 symptoms, worries, and generalized anxiety levels

Fernando J. García-Hedra¹, Fernanda Gil-Almagro¹, F. Javier Carmona-Monge², Cecilia Peñacoba-Puente³, Patricia Catalá-Mesón³, Lilian Velasco-Furlong³

¹Unidad de Cuidados Críticos, Hospital Universitario Fundación Alcorcón, Madrid; ²Servicio de Anestesiología, Complejo Hospitalario Universitario de Santiago de Compostela, Santiago de Compostela; ³Departamento de Psicología, Universidad Rey Juan Carlos, Alcorcón, Spain

Background: The severe acute respiratory syndrome coronavirus 2 outbreak has been identified as a pandemic and global health emergency. It presents as a severe acute respiratory disease. The rapid dissemination of the disease created challenges for healthcare systems and forced healthcare workers (HCWs) to deal with many clinical and nonclinical stresses. The aim of our research is to describe work conditions, symptoms experienced by HCWs, worries about contagion, and generalized anxiety symptoms and compare those findings across regions in Spain.

Methods: This cross-sectional study was conducted using an online survey. Critical care units throughout Spain were included. The sample comprised HCWs working in intensive care units from March to May 2020. We assessed work variables, physical symptoms, worries about contagion, and anxiety (generalized anxiety disorder-7 questionnaire).

Results: The final sample comprised 448 surveys. Among the respondents, 86.9% (n = 389) were nursing professionals, and 84.8% (n = 380) were women. All participants cared for coronavirus disease 2019 (COVID-19) patients during the study period. Workload during the pandemic in Madrid was judged to be higher than in other regions (P < 0.01). The availability of personal protective equipment was found to be higher in Cataluña. The most frequently experienced symptom was headaches (78.1%). Worries about self-infection and the possibility of infecting others received mean scores of 3.11 and 3.75, respectively. Mean scores for generalized anxiety levels were 11.02, with 58.7% of the professionals presenting with generalized anxiety syndrome during the assessment.

Conclusions: In this study, we found high levels of anxiety among HCWs caring directly for COVID-19 patients, which could produce long-term psychological alterations that still need to be assessed.

Key Words: anxiety; COVID-19; health personnel; intensive care units; personal protective equipment; psychological stress; SARS-CoV-2

INTRODUCTION

On December 31, 2019, the municipal health commission of the city of Wuhan (Hubei Province, China) reported the existence of 27 cases of pneumonia of unknown etiology. The onset

Original Article

Received: February 17, 2021

Revised: April 12, 2021

Accepted: May 1, 2021

Corresponding author

Fernanda Gil-Almagro
Unidad de Cuidados Críticos,
Hospital Universitario Fundación
Alcorcón, c/ Budapest 1, 28922
Alcorcón (Madrid), Spain
Tel: +34-6-2645-9149
Fax: +34-9-1621-9750
E-mail: fgilalmagro@gmail.com

Copyright © 2021 The Korean Society
of Critical Care Medicine

This is an Open Access article distributed
under the terms of Creative Attributions
Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>)
which permits unrestricted noncommercial
use, distribution, and reproduction in any
medium, provided the original work is
properly cited.

of symptoms had occurred on December 8, and seven of the cases were severe. At that point, the source of the outbreak was undisclosed. On January 7, 2020, Chinese authorities identified the causal agent as a new RNA virus of the Coronaviridae family, and the condition was therefore named severe acute respiratory syndrome coronavirus 2 (SARS-Cov-2). Since that time, we have learned that transmission occurs through respiration, i.e., the virus is held in droplets of exhaled air that then have direct contact with the conjunctiva and nasal and oral mucosa of nearby people [1,2]. On March 11, 2020, the World Health Organization labeled the situation a global pandemic [3]. In the weeks immediately after that declaration, two countries with a particularly high incidence of cases and mortality were Spain and Italy [4,5]. In both countries, specific regions experienced overwhelming demand on the health care system, far surpassing the capacity of hospitals to attend to all the patients needing medical care [6]. In Spain, furthermore, the health system has decentralized, economic management, so the competence of the human and material resources is the responsibility of each region. Despite the important benefits offered by this type of organization in most situations, it can produce regional differences in management during an emergency situation such as a global pandemic, and those managerial differences can produce different health results [7].

As of July 24, 2020, Spain has reported a total of 272,241 confirmed cases. Of those patients, 126,315 (46.4%) have been hospitalized, and 11,743 have been admitted to an intensive care unit (ICU) (4.3%). Spain has had one of the highest incidences of coronavirus disease 2019 (COVID-19) in the world [6,8]. Nationwide, all regions have been affected by COVID-19 to some extent, and the national health system and its workers have been subjected to a heavier burden than ever before. However, some regions have been more severely affected by COVID-19 than others. Madrid (73,944 cases) and Cataluña (72,919 cases) have had more cases, hospital admissions, and ICU admissions than other regions, at least in part because they contain the two largest cities in Spain: Madrid, the capital of Spain, has a population of 3,334,730 plus a large population in the city's suburbs, and Barcelona, which has a population of 1,664,182 without counting its suburbs. Their high population density and the agglomerations of people using public transport and those cities' large leisure and shopping areas facilitated early contagion between individuals and allowed the virus to spread rapidly.

The most acute phase of the pandemic placed a huge strain on healthcare workers (HCWs), which greatly affected both their physical and emotional well-being. Hospital systems ran

KEY MESSAGES

- Organizational issues and perceived risks seem to affect healthcare worker (HCW) mental health.
- Worry about self-infection was an important source of stress for HCW during the first wave of the pandemic.
- Regions in Spain differed widely in the availability of personal protective equipment and perceived workload from March to May 2020, which needs to be addressed to ensure that all regions have equal resources in future crisis situations.

well above their full capacity, and serious shortages of critical care resources such as ventilators and personal protective equipment (PPE) occurred [9]. The lack of appropriate PPE, including gloves, face shields, gowns, and hand sanitizer, was a particular source of anxiety and stress among frontline HCWs. The lack of essential PPE might also have fed the high rates of infection among professionals seen in both Italy and Spain (although PPE availability was not distributed equally) [10,11]. Thus, resource shortages could have had a role in the development of anxiety, physical fatigue, or difficulties in work performance. A report from China suggests that COVID-19 HCWs are experiencing elevated rates of mental health problems [12].

Different studies have identified fear of contagion (for oneself, children, or family) as another source of stress among the HCWs dealing with this pandemic. That fear can be exacerbated by a reduced availability of PPE, shortages of medical resources in the ICU, and working at full ICU capacity, and it has also been identified as a source of issues such as insomnia, irritability, and decreased appetite [12-15].

Our aim in this study was to describe and compare different regions in Spain (Madrid, Cataluña, and the remaining regions [RRs]) in terms of the work conditions for frontline HCWs that could have acted as stressors during the pandemic. Furthermore, we aimed to describe COVID-19 symptoms experienced by HCWs during the pandemic and compare them among regions. Finally, we analyzed HCWs' worries about contagion and generalized anxiety symptoms and compared them among regions.

MATERIALS AND METHODS

Design

This cross-sectional study collected data using an online electronic form designed for this purpose by the research team. Data were collected during May and June 2020 from HCWs

who worked in ICUs from March to May 2020.

Study Variables

We began by reviewing previous surveys used to assess the conditions of HCWs during this pandemic and previous outbreaks of infectious diseases (SARS, Middle East respiratory syndrome [MERS], and H1N1) [16-19]. Then we collected information regarding the work situation of ICU professionals and the physical symptoms they experienced during the time they were caring for COVID-19 patients, as reported by Stokes et al. [20] (fever, chills, headache, cough, myalgias, shortness of breath, dizziness, rhinitis, sore throat, chest pain, anosmia, ageusia, and skin manifestations).

To assess the level of concern HCWs felt regarding infection, we used two items designed for that purpose that are similar to those used by Wang et al. [19] in their research: what is your level of concern about the possibility that you will contract COVID-19? and what is your level of concern that you could cause a member of your family to contract COVID-19? Those questions were answered using a Likert-type scale that ranged from 1 (not worried at all) to 4 (very worried).

Anxiety was assessed using the Spanish version of the generalized anxiety disorder (GAD)-7 questionnaire, which is a one-dimensional, self-administered scale designed to test for the presence of the GAD symptoms listed in the Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV [21,22]. The total GAD-7 score is calculated by adding the answers for each item. Scores for all seven items range from 0 (not at all) to 3 (nearly every day). Therefore, the total score ranges from 0 to 21. The cut-off point for a diagnosis of GAD is a score equal to or greater than 10 [21]. The reliability of the scale in our sample was high, with a Cronbach's alpha value of 0.92.

Sample Election and Data Collection

Data were collected using an online survey designed by the research team. The first page contained a description of the study's main objective. Sample selection was performed using a convenience, non-probabilistic snowball approach. First, we contacted critical care colleagues and sent them the survey link, asking them to help us reach other professionals working in their units or any other HCWs who might be interested in completing the survey. We also used social media networks (Facebook, Twitter, LinkedIn) to send the survey link to professional societies, health institutions, and Spanish professionals working in the Spanish health care system during the COVID-19 pandemic. The sample comprised registered nursing professionals and attending physicians working in critical care

units and post-surgical critical care units from March to June 2020. All the participants cared for COVID-19 patients during that period. For the analyses, the sample was sorted into three groups by their location: Madrid, Cataluña, and the RR.

This study was approved by the Ethics Committee of the Hospital Universitario Fundación Alcorcón (20/88), and all participants provided informed consent to use all the data they provided before they completed the questionnaire.

Statistical Analysis

Analyses were performed using the IBM SPSS ver. 24 (IBM SPSS Corp., Armonk, NY, USA). Descriptive analyses and internal consistency analyses (Cronbach's alpha coefficients) were performed. The regional comparisons of the study variables (Madrid, Cataluña, and RR) used a one-way analysis of variance for quantitative variables with post-hoc Scheffé testing. For the qualitative variables, chi squares tests were performed. Differences were considered significant at $P < 0.05$.

RESULTS

Sample Characteristics

The final sample comprised 448 surveys completed by personnel working in ICUs or post-surgical critical care units throughout Spain. Within the total sample, 86.9% ($n = 389$) of respondents were nursing professionals, and 84.8% ($n = 380$) were women. Furthermore, 61.2% ($n = 274$) were married or living with a partner, and 32.1% ($n = 144$) were single. About forty percent (39.3%, $n = 176$) had children living at home. The mean age of the respondents was 39.69 (standard deviation [SD], 10.55) in a range from 18 to 64 years. Most of the study population, 93.5% ($n = 419$), lived at home during the pandemic, but 6.5% ($n = 29$) lived at a hotel or home different from their usual one.

Work Variables

Table 1 shows descriptive statistics about work-related variables for the total sample, along with differences among regions. For the regional analyses, the sample was grouped by their location: Madrid ($n = 238$, 53.1%), Cataluña ($n = 87$, 19.4%), and RR ($n = 123$, 27.5%). Despite our efforts to provide a full picture of the situation for critical care professionals in Spain, responses were not homogeneous throughout the country, with some regions returning fewer than five responses (i.e., Galicia, Extremadura, and La Rioja) and some returning no responses, leaving them unrepresented in this research (i.e., Melilla).

Table 1. Sociodemographic characteristics of the sample

Variable	Total sample (n=448)	Madrid (1) (n=238, 53.1%)	Cataluña (2) (n=87, 19.4%)	RR (3) (n=123, 27.5%)	F/ χ^2	P-value
Experience in the unit (yr)	9.78±9.21	8.82±8.46	9.44 ±9.32	11.89±10.21	F=4.675	0.010 ^a
Work status					$\chi^2=5.203$	0.267
Permanent	222 (49.6)	107 (45)	51 (58.6)	64 (52)		
Intern	94 (21)	55 (23.1)	15 (17.2)	24 (19.5)		
Temporary	132 (29.5)	76 (31.9)	21 (24.1)	35 (28.5)		
Shift					$\chi^2=73.914$	<0.001
Fixed shift	61 (13.6)	19 (8)	34 (39.1)	8 (6.5)		
Shift rotation	169 (37.7)	100 (42)	13 (14.9)	56 (45.5)		
Shifts+on call	45 (10)	29 (12.2)	2 (2.3)	14 (11.4)		
12/24 hours	173 (38.6)	90 (37.8)	38 (43.7)	45 (36.6)		
Weekly hours	45.01±10.9	45.90±11.1	45.66±10.4	42.87±10.6	F=3.361	0.036 ^b
Transferred to the ICU (yes)	151 (33.7)	84 (35.3)	35 (40.2)	32 (26)	F=5.181	0.075
Specifically hired for ICU during pandemic (yes)	65 (14.5)	34 (14.3)	14 (16.1)	17 (13.8)	F=0.232	0.890
Increase in the number of beds (yes)	411 (91.7)	230 (96.6)	73 (83.9)	108 (87.8)	F=17.095	<0.001
Number of COVID patients					$\chi^2=23.765$	0.001
<5	8 (1.8)	3 (1.3)	1 (1.1)	4 (3.3)		
5–10	38 (8.5)	7 (2.9)	12 (13.8)	19 (15.4)		
11–20	137 (30.6)	75 (31.5)	29 (33.3)	33 (26.8)		
>20	265 (59.2)	153 (64.3)	45 (51.7)	67 (54.5)		
Patient/professional ratio during the pandemic					$\chi^2=35.867$	<0.001
Lower than usual	79 (17.6)	30 (12.6)	11 (12.6)	38 (30.9)		
Same as usual	181 (40.4)	90 (37.8)	52 (59.8)	39 (31.7)		
Higher than usual	88 (42)	118 (49.6)	24 (27.6)	46 (37.4)		
Workload during the pandemic					$\chi^2=12.215$	0.016
Lower than usual	4 (0.9)	0	1 (1.1)	3 (2.4)		
Same as usual	19 (4.2)	6 (2.5)	3 (3.4)	10 (8.1)		
Higher than usual	425 (94.9)	232 (97.5)	83 (95.4)	110 (89.4)		
PPE availability					$\chi^2=31.021$	<0.001
No, never	13 (2.9)	9 (3.8)	0	4 (3.3)		
Not enough	199 (44.4)	119 (50)	26 (29.9)	54 (43.9)		
Most of the time	182 (40.6)	92 (38.7)	51 (58.6)	39 (31.7)		
Yes, always	54 (12.1)	18 (7.6)	10 (11.5)	26 (21.1)		

Values are presented as mean±standard deviation or number (%).

RR: remaining region; ICU: intensive care unit; COVID: coronavirus disease; PPE: personal protective equipment.

^aScheffé post-hoc (1–3), P=0.001; ^bScheffé post-hoc (1–3), P=0.043.

Generally speaking, the HCWs working during the pandemic had 10 years of work experience; half of them worked on permanent contracts, and they worked rotating or 12/24-hour shifts. Our respondents worked 45 hours per week on average. One third of them were transferred to the ICU during the pandemic, and 14.5% of them were hired specifically for ICU work

during this period. Overload indicators were widespread during this period. More than 90% of our respondents reported that their hospitals expanded the number of beds, about 60% treated more than 20 COVID patients, and 95% reported that their workloads were higher than usual. Almost half (45%) of our sample did not always have adequate PPE.

Differences between Madrid, Cataluña, and the RR. Significant differences were found among all groups regarding work experience in ICU (years) ($P=0.010$). Significant post-hoc differences were found ($P=0.011$) between Madrid (with the lowest scores; mean, 8.82) and the RR (with the highest scores; mean, 11.89).

Statistically significant differences were also observed in the types of shifts worked ($P<0.001$). Madrid and the RR showed high rates of rotating shifts (42% and 45.5%, respectively), whereas HCWs in Cataluña reported a high percentage of fixed shifts (39.1%). The 12/24 hour shift was found in similar percentages in all three locations, around 40%. Weekly hours worked also differed significantly between Madrid, with the highest scores (mean, 45.90), and the RR (mean, 42.87) ($P=0.036$).

Statistically significant differences were observed between Madrid (96.6%) and Cataluña (83.9%) in hospitals that increased the number of beds ($P<0.001$). The number of COVID patients per unit also differed significantly ($P=0.001$) between Madrid, which had the highest percentages of patients in ICU, and the rest of the regions (95.8% vs. 81.3% had more than 11 patients). The patient/professional ratio during the pandemic differed significantly between regions ($P<0.001$) as well. In Madrid, 49.6% of professionals rated it as higher than usual, compared with 27.6% in Cataluña. Regarding the workload during the pandemic ($P=0.016$), 97.5% of professionals in Madrid judged it as higher than usual, compared with 89.4% in the other regions. Finally, regarding the availability of PPE

($P<0.001$), the least satisfied professionals were in Madrid and RR, where 53.8% and 47.2% of respondents, respectively, reported that it was not always available. HCWs in Cataluña reported the highest availability of PPE, with only 29.9% saying it was not always available.

COVID-19 Symptoms

Table 2 shows descriptive statistics about COVID-19 symptoms for the total sample, along with differences among regions. The most frequently experienced symptom was headaches (78.1%). Sore throats were present in fewer than half of the participants (42.2%). The least experienced symptoms were anosmia and ageusia (8.9% and 9.2% respectively). All the percentages were similar among professionals from different regions. The only statistically significant differences observed were in myalgias ($P=0.020$), with professionals from Madrid (42.1%) reporting them most often.

Worries about Infection and Anxiety

Table 3 shows HCWs' worries about self-infection (3.11) and about the possibility of infecting others (3.75) (range, 1–4). The generalized anxiety scores were 11.02 (SD, 5.57; range, 0–21). Given the cut-off point established for diagnosis (scores equal to or greater than 10), 58.7% of our HCW respondents presented with GAD at the moment of assessment. No statistically significant differences between regions were found for these indicators.

Table 2. Clinical manifestations of COVID-19

Symptom	Total sample (n=448)	Madrid (n=238, 53.1%)	Cataluña (n=87, 19.4%)	RR (n=123, 27.5%)	F	P-value
Fever	55 (17.5)	39 (19.3)	8 (12.3)	8 (16.7)	1.696	0.428
Chills	69 (21.9)	46 (22.8)	11 (16.9)	12 (25)	1.301	0.522
Headache	246 (78.1)	165 (81.7)	46 (70.8)	35 (72.9)	4.312	0.116
Cough	117 (37.1)	83 (41.1)	21 (32.3)	13 (27.1)	4.079	0.130
Myalgia	115 (36.5)	85 (42.1)	16 (24.6)	14 (29.2)	7.787	0.020
Shortness of breath	41 (13)	31 (15.3)	3 (4.6)	7 (14.6)	5.125	0.077
Dizziness	69 (21.9)	49 (24.3)	11 (16.9)	9 (18.8)	1.876	0.391
Rhinitis	71 (22.5)	47 (23.3)	17 (26.2)	7 (14.6)	2.288	0.319
Sore throat	133 (42.2)	85 (42.1)	29 (44.6)	19 (39.6)	0.291	0.864
Chest pain	63 (20)	45 (22.3)	11 (16.9)	7 (14.6)	1.920	0.383
Anosmia	28 (8.9)	19 (9.4)	7 (10.8)	2 (4.2)	1.672	0.433
Ageusia	29 (9.2)	21 (10.4)	6 (9.2)	2 (4.2)	1.801	0.406
Skin manifestations	46 (14.6)	30 (14.9)	9 (13.8)	7 (14.6)	0.040	0.980

Values are presented as number (%).

COVID-19: coronavirus disease 2019; RR: remaining region.

Table 3. Worry about contagion and generalized anxiety disorder

Variable	Total sample (n= 448)	Madrid (n=238, 53.1%)	Cataluña (n=87, 19.4%)	RR (n= 123, 27.5%)	F/ χ^2	P-value
Worried about own contagion	3.11±0.79	3.12±0.80	3.11±0.75	3.04±0.78	F=0.208	0.592
Worried about family contagion	3.75±0.57	3.73±0.61	3.82±0.46	3.75±0.52	F=0.513	0.599
Generalized anxiety disorder	11.02±5.57	11.20±5.71	10.98±0.64	10.29±5.50	F=0.524	0.592
GAD-7 ≥ 10	263 (58.7)	145 (60.9)	48 (55.2)	70 (56.9)	$\chi^2=1.095$	0.578

Values are presented as mean ± standard deviation or number (%).

RR: remaining region; GAD: generalized anxiety disorder.

DISCUSSION

In this study, we have described the work conditions, physical symptoms resembling COVID-19, and generalized anxiety symptoms of HCWs working in ICUs and compared those results across different regions of Spain. The findings of this study indicate that ICU personnel experienced high levels of anxiety (about 60% of the population had scores meeting a GAD diagnosis) throughout Spanish territory. Regional differences were found in important working conditions, such as the amount of experience professionals had in the ICU, patient to professional ratio during the pandemic, and PPE availability during the study period.

Several studies have highlighted the significant mental-health consequences that this pandemic has had for the HCWs working on its front lines. However, no previous studies have focused on critical care workers. Furthermore, to the best of our knowledge, this is the first study to assess Spanish ICU workers at a moment when the critical situation created by the pandemic was still occurring. Several studies assessed anxiety among COVID-19 workers in China, and they used different tools for their assessments [23]. The estimated prevalence of anxiety in those studies was 23.1%, which is significantly lower than the result we obtained in this study. We found that in the three months following the onset of the pandemic, up to 60% of the HCWs assessed met the criteria for a GAD diagnosis according to the answers they provided to the GAD-7 questionnaire [12,24-26]. The data about anxiety obtained in China were very similar for both HCWs and the general population. In Italy, Rossi et al. [27] found results similar to the Chinese studies regarding the prevalence of anxiety in HCWs (19.80%). In New York state, nurses were more likely than attending physicians and house staff to screen positive for anxiety (40% vs. 15% and 17%, respectively) [28]. In Spain, González-Sanguino et al. [29] used the GAD-2 questionnaire to test the general population and found a prevalence of anxiety that was much lower than what we found in our sample of HCWs (21.6% vs.

58.7%). The variability of those results could reflect the different instruments used and the different moments of measurement. In this context, it should be remembered that we were surveying ICU HCWs in Spain during the most critical months of the pandemic. The higher prevalence of anxiety in our sample could also reflect the fact that the response rate to our survey was highest among professionals working in the regions of Spain most heavily affected by COVID-19, which also saw a higher rate of hospital and ICU admissions than other areas. Although the results presented here are not in accordance with those of previous studies, the high prevalence in anxiety in this sample highlights the devastating effects that the COVID-19 pandemic has had on the psychological health of HCWs [30]. These results show the uncontestable need for a change in health care institutions. A team dedicated to training HCWs in the management of their emotions would be an interesting addition to these environments. Such training would give professionals facing a new pandemic training in emotional control and equip them with the tools and skills they need to face work alterations and thus prevent the development of psychological disorders [31]. In fact, some healthcare systems and professional organizations have already pointed out the need to develop recovery plans to reduce the onset of mental illness and maximize the chance for psychological growth among HCWs [32,33].

Although a worldwide PPE shortage did occur during the present situation, almost half (48%) of the current sample reported inadequate access to it. Furthermore, that perception was unequal among professionals from different regions. Professionals working in Cataluña and the RRs perceived that they had access to enough PPE always or most of the time, but in Madrid, the general perception was of a lack of adequate equipment for self-protection. Despite the benefits of decentralized health care management, some aspects should be regulated by the central government to prevent inequities of access to specific materials such as PPE [34,35]. The decentralized health care system in Spain has already been the subject of different

analyses, and the pandemic has revitalized those debates in the scientific and political communities; similar analyses have been conducted in other countries with decentralized health care systems [36].

Regarding social and work-related variables, it should be highlighted that professionals in Madrid had less ICU work experience than HCWs in other regions. Patients admitted to the ICU during the pandemic had elevated care needs, required highly complex procedures and assistance, and would have benefited from the care of highly trained professionals. Several scientific societies have made statements highlighting the importance of being able to access professionals able to adequately work in critical care and effectively manage COVID-19 patients, emphasizing the need to train new specialists to be prepared for future outbreaks [37-39]. Specifically in Spain, registered nurses don't have a specialty in critical care that is regulated by the Health Ministry, despite demand for one over many years by professionals working in the field, professional societies, and professional colleges. The current pandemic could be an opportunity to finally fully develop that specialty [37]. Moreover, the need to create multidisciplinary teams that can attend to critical care patients in times of crisis is a fact, and the prominent role of anesthesiologists during this pandemic has reinforced their supporting role in critical care facilities [40,41]. On the other hand, it's interesting to note that most of the HCWs in our sample perceived that their overall workload had been greater than usual, despite the fact that the patient to professional ratio had not increased. Although we don't have enough information to determine why that discrepancy occurred, we suspect that it reflects the high complexity and care needs of COVID-19 patients and the high proportion of professionals without much experience in managing critical care patients who were asked to work in the ICU during this moment [42]. Further research is necessary to analyze that finding in more depth.

Most of our respondents reported having suffered from some COVID-19-related symptoms during the pandemic. The most frequently reported were unspecific and could be associated with other situations, such as headaches, which were reported by almost 75% of our professional respondents. Headaches could be associated with other situations, such as the high workload, elevated number of work shifts, or the stress derived from taking care of COVID-19 patients. In fact, Ong et al. [43] found that up to 81% of professionals reported suffering headaches or exacerbations of their usual headaches, which could also be related to the continuous use of PPE. Some of the symptoms reported could have derived from being in a lockdown,

which was an extra stressor for HCWs. Several studies have highlighted the role of the lockdown in the emergence of unspecific physical symptoms, as well as the appearance of anxiety and stress among the general population; therefore, it cannot be ruled out that something similar could have happened among ICU workers [44-46].

Symptoms specific to COVID-19, such as shortness of breath or fever, appeared at a lower, but still significant, frequency (from 8.9% to 42.2%) in the current sample of ICU workers. These results are similar to those found by Cao et al. [47], who reported that practically all the professionals in their sample suffered from mild body discomfort, including tiredness; sore throat; cough; neck, shoulder and back pain; nausea; and even skin manifestations, although none of those participants were infected by the coronavirus [48].

This study has some limitations, the most important of which could be the non-probabilistic sample selection, which might have caused the overrepresentation of certain regions (mainly Madrid and Cataluña, which were more affected by the pandemic than other areas) and work categories. This is a correlational study and thus cannot establish causality among the results. Furthermore, we could not analyze the relationships between certain variables, such as working conditions and anxiety. However, despite those limitations, this is the first work to assess the effects of work-related variables on HCWs in the Spanish health care system during the COVID-19 pandemic; it provides particularly interesting information about the effects that worries about contagion and anxiety had on respondents.

Due to the magnitude and characteristics of the COVID-19 pandemic, ICU staff have been severely affected both physically and psychologically. In this study, high levels of anxiety were found among HCWs who cared directly for COVID-19 patients. The long-term psychological consequences of those alterations still need to be assessed. As different authors have highlighted, programs to mitigate anxiety among HCWs should be integrated into hospital policies to prepare for future pandemics.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

ORCID

Fernando J. García-Hedrerá

<https://orcid.org/0000-0001-5539-5773>

Fernanda Gil-Almagro

<https://orcid.org/0000-0002-1079-281X>

F. Javier Carmona-Monge

<https://orcid.org/0000-0003-3431-238X>

Cecilia Peñacoba-Puente

<https://orcid.org/0000-0001-6307-5921>

Patricia Catalá-Mesón

<https://orcid.org/0000-0003-4989-9099>

Lilian Velasco-Furlong

<https://orcid.org/0000-0002-6787-324X>

AUTHOR CONTRIBUTIONS

Conceptualization: FGA, FJCM. Data curation: FJGH, CPP. Formal analysis: CPP, PCM, LVE. Methodology: FGA. Project administration: FJCM. Visualization: FJGH. Writing—original draft: FGA, FJGH. Writing—review & editing: PCM, LVE.

REFERENCES

- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020;395:507-13.
- The Lancet. Emerging understandings of 2019-nCoV. *Lancet* 2020;395:311.
- World Health Organization. Novel Coronavirus (2019-nCoV) technical guidance [Internet]. Geneva: World Health Organization; 2020 [cited 2020 Aug 10]. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance>.
- Vestergaard LS, Nielsen J, Richter L, Schmid D, Bustos N, Braeye T, et al. Excess all-cause mortality during the COVID-19 pandemic in Europe: preliminary pooled estimates from the EuroMOMO network, March to April 2020. *Euro Surveill* 2020; 25:2001214.
- James N, Menzies M, Radchenko P. COVID-19 second wave mortality in Europe and the United States. *Chaos* 2021;31:031105.
- Legido-Quigley H, Mateos-García JT, Campos VR, Gea-Sánchez M, Muntaner C, McKee M. The resilience of the Spanish health system against the COVID-19 pandemic. *Lancet Public Health* 2020;5:e251-2.
- Parrado S, Galli D. Intergovernmental veto points in crisis management: Italy and Spain facing the COVID-19 pandemic. *Int Rev Adm Sci* 2021 Jan 17 [Epub]. <https://doi.org/10.1177/0020852320985925>.
- Ministerio de Sanidad. Enfermedad por nuevo coronavirus, COVID-19. Situación actual [Internet]. Madrid: Ministerio de Sanidad; 2020 [cited 2020 Aug 10]. Available from: <https://www.msbs.gob.es/profesionales/saludPublica/ccayes/alertasActual/nCov-China/situacionActual.htm>.
- Ripp J, Peccoralo L, Charney D. Attending to the emotional well-being of the health care workforce in a New York City health system during the COVID-19 pandemic. *Acad Med* 2020;95:1136-9.
- Lintern S. Coronavirus: Italian doctors warn protective equipment vital to prevent healthcare system collapse. London: Independent; 2020.
- Sevillano EG. La falta de mascarillas y respiradores pone en tensión a los hospitales españoles [Internet]. Sociedad: El País; 2020 [cited 2021 Jul 30]. Available from: <https://elpais.com/sociedad/2020-03-12/la-falta-de-mascarillas-y-respiradores-pone-en-tension-a-los-hospitales-espanoles.html>.
- Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open* 2020;3:e203976.
- Maunder R, Hunter J, Vincent L, Bennett J, Peladeau N, Leszcz M, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ* 2003;168:1245-51.
- Dai Y, Hu G, Xiong H, Qiu H, Yuan X. Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on health-care workers in China. *MedRxiv* 20030874 [Preprint]. 2020 [cited 2021 Jan 1]. Available from: <https://doi.org/10.1101/2020.03.03.20030874>.
- Dubey S, Biswas P, Ghosh R, Chatterjee S, Dubey MJ, Chatterjee S, et al. Psychosocial impact of COVID-19. *Diabetes Metab Syndr* 2020;14:779-88.
- Lee SM, Kang WS, Cho AR, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry* 2018;87:123-7.
- Kim HC, Yoo SY, Lee BH, Lee SH, Shin HS. Psychiatric findings in suspected and confirmed middle east respiratory syndrome patients quarantined in hospital: a retrospective chart analysis. *Psychiatry Investig* 2018;15:355-60.
- Wu KK, Chan SK, Ma TM. Posttraumatic stress after SARS. *Emerg Infect Dis* 2005;11:1297-300.
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health* 2020;17:1729.

20. Stokes EK, Zambrano LD, Anderson KN, Marder EP, Raz KM, El Burai Felix S, et al. Coronavirus disease 2019 case surveillance: United States, January 22-May 30, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:759-65.
21. 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.
22. Muñoz-Navarro R, Cano-Vindel A, Moriana JA, Medrano LA, Ruiz-Rodríguez P, Agüero-Gento L, et al. Screening for generalized anxiety disorder in Spanish primary care centers with the GAD-7. *Psychiatry Res* 2017;256:312-7.
23. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun* 2020;88:901-7.
24. Huang L, Lei W, Xu F, Liu H, Yu L. Emotional responses and coping strategies in nurses and nursing students during Covid-19 outbreak: a comparative study. *PLoS One* 2020;15:e0237303.
25. Liu N, Zhang F, Wei C, Jia Y, Shang Z, Sun L, et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: gender differences matter. *Psychiatry Res* 2020;287:112921.
26. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom* 2020;89:242-50.
27. Rossi R, Socci V, Pacitti F, Di Lorenzo G, Di Marco A, Siracusano A, et al. Mental health outcomes among frontline and second-line health care workers during the coronavirus disease 2019 (COVID-19) pandemic in Italy. *JAMA Netw Open* 2020; 3:e2010185.
28. Shechter A, Diaz F, Moise N, Anstey DE, Ye S, Agarwal S, et al. Psychological distress, coping behaviors, and preferences for support among New York healthcare workers during the COVID-19 pandemic. *Gen Hosp Psychiatry* 2020;66:1-8.
29. González-Sanguino C, Ausín B, Castellanos MÁ, Saiz J, López-Gómez A, Ugidos C, et al. Mental health consequences during the initial stage of the 2020 coronavirus pandemic (COVID-19) in Spain. *Brain Behav Immun* 2020;87:172-6.
30. Badahdah A, Khamis F, Al Mahyijari N, Al Balushi M, Al Hatmi H, Al Salmi I, et al. The mental health of health care workers in Oman during the COVID-19 pandemic. *Int J Soc Psychiatry* 2021;67:90-5.
31. Feinstein RE, Kotara S, Jones B, Shanor D, Nemeroff CB. A health care workers mental health crisis line in the age of COVID-19. *Depress Anxiety* 2020;37:822-6.
32. Greenberg N, Brooks SK, Wessely S, Tracy DK. How might the NHS protect the mental health of health-care workers after the COVID-19 crisis? *Lancet Psychiatry* 2020;7:733-4.
33. Canady VA. MH leaders, insurers unite on COVID-19 resource toolkit. *Ment Health Wkly* 2020;30:3-5.
34. Hortal-Carmona J, Padilla-Bernáldez J, Melguizo-Jiménez M, Ausín T, Cruz-Piqueras M, López de la Vieja MT, et al. Efficiency is not enough. Ethical analysis and recommendations for the allocation of scarce resources in a pandemic situation. *Gac Sanit* 2021 Jan 25 [Epub]. <https://doi.org/10.1016/j.gaceta.2020.07.006>.
35. Campos MS, Fernández-Montes A, Gavilan JM, Velasco F. Public resource usage in health systems: a data envelopment analysis of the efficiency of health systems of autonomous communities in Spain. *Public Health* 2016;138:33-40.
36. Bello-Gomez RA, Sanabria-Pulido P. The costs and benefits of duality: Colombia's decentralization and the response to the COVID-19 pandemic. *Rev Adm Publica* 2021;55:165-79.
37. Raurell-Torredà M, Martínez-Estalella G, Frade-Mera MJ, Carrasco Rodríguez-Rey LF, Romero de San Pío E. Reflections arising from the COVID-19 pandemic. *Enferm Intensiva (Engl Ed)* 2020;31:90-3.
38. Raurell-Torredà M. Management of ICU nursing teams during the COVID-19 pandemic. *Enferm Intensiva (Engl Ed)* 2020; 31:49-51.
39. Rascado Sedes P, Ballesteros Sanz MÁ, Bodí Saera MA, Carrasco Rodríguez-Rey LF, Castellanos Ortega Á, Catalán González M, et al. Plan de contingencia para los servicios de medicina intensiva frente a la pandemia COVID-19. *Med Intensiva* 2020; 44:363-70.
40. Yang M, Dong H, Lu Z. Role of anaesthesiologists during the COVID-19 outbreak in China. *Br J Anaesth* 2020;124:666-9.
41. Ferrando C, Colomina MJ, Errando CL, Llau JV. Anesthesiology and the anesthesiologists at COVID-19. *Rev Esp Anestesiol Reanim (Engl Ed)* 2020;67:289-91.
42. Nayna Schwerdtle P, Connell CJ, Lee S, Plummer V, Russo PL, Endacott R, et al. Nurse expertise: a critical resource in the COVID-19 pandemic response. *Ann Glob Health* 2020;86:49.
43. Ong JJ, Bharatendu C, Goh Y, Tang JZ, Sooi KW, Tan YL, et al. Headaches associated with personal protective equipment: a cross-sectional study among frontline healthcare workers during COVID-19. *Headache* 2020;60:864-77.
44. Gómez-Salgado J, Andrés-Villas M, Domínguez-Salas S, Díaz-Milanés D, Ruiz-Frutos C. Related health factors of psychological distress during the COVID-19 pandemic in Spain. *Int J Environ Res Public Health* 2020;17:3947.
45. Mengin A, Allé MC, Rolling J, Ligier F, Schroder C, Lalanne L,

- et al. Psychopathological consequences of confinement. *Encephale* 2020;46:S43-52.
46. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Mas-moudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. *Nutrients* 2020;12:1583.
47. Cao J, Wei J, Zhu H, Duan Y, Geng W, Hong X, et al. A study of basic needs and psychological wellbeing of medical workers in the fever clinic of a tertiary general hospital in Beijing during the COVID-19 outbreak. *Psychother Psychosom* 2020;89:252-4.
48. Chew NW, Lee GK, Tan BY, Jing M, Goh Y, Ngiam NJ, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* 2020;88:559-65.