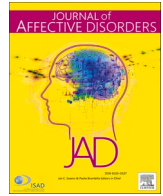




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Short communication

Role of access to personal protective equipment, treatment prioritization decisions, and changes in job functions on health workers' mental health outcomes during the initial outbreak of the COVID-19 pandemic.

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ABSTRACT

Background: During the initial COVID-19 outbreak, organizational changes were required to ensure adequate staffing in healthcare facilities. The extent to which organizational changes impacted the mental wellbeing of healthcare workers (HCWs) remains unexplored. Here we analyzed the association between three work-related stressors (reported access to protective equipment, change in job functions, and patient prioritization decision-making) and mental health outcomes (depression symptoms, psychological distress, suicidal thoughts, and fear of infection) in a large sample of Spanish HCWs during the initial COVID-19 outbreak.

Methods: We conducted a cross-sectional study including HCWs from three regions of Spain between April 24th and June 22nd, 2020. An online survey measured sociodemographic characteristics, work-related stressors, fear of infection, and mental health outcomes (depression [PHQ-9], psychological distress [GHQ-12], death wishes [C-SSRS]). We conducted mixed-effects regression models to adjust all associations for relevant individual- and region-level sources of confounding.

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Results: We recruited 2,370 HCWs. Twenty-seven percent screened positive for depression and 74% for psychological distress. Seven percent reported death wishes. Respondents were more afraid of infecting their loved ones than of getting infected themselves. All work-related stressors were associated with depression symptoms and psychological distress in adjusted models.

Limitations: Non-probabilistic sampling, potential reverse causation.

Conclusions: Modifiable work-related stressors are associated with worse mental health among HCWs. Our results suggest that workplace prevention strategies for HCWs should provide sufficient protective equipment, minimize changes in job functions, favor the implementation of criteria for patient triage and on-call bioethics committees, and facilitate access to stepped-care, evidence-based mental health treatment.

The COVID-19 pandemic has strained national health systems across the globe, driving major reorganizations to address increases in emergency care capacity needs (Armocida et al., 2020; García-Basteiro et al., 2020). Ensuring adequate clinical staffing during pandemic peaks has been especially challenging: organizational changes have often included redeploying healthcare workers (HCWs) into frontline positions and extending their working hours. Understanding the impact of such changes on the mental wellbeing of HCWs is critical to inform healthcare management decision making.

Several reports identify HCWs as a particularly high-risk group for psychological distress and mental health disorders due to elevated contagion rates and social stigma in addition to the stress driven by society-wide public health measures and socioeconomic uncertainty (da Silva Neto et al., 2021; Pappa et al., 2020; Salazar de Pablo et al., 2020). In Spain, where 1 in 6 HCWs had been infected with SARS-CoV-2 as of November 2020 (Ministerio de Sanidad, 2020), studies conducted during the first wave of the pandemic have reported remarkably high rates of probable mental disorders, as measured with different screening tools, among HCWs (Alonso et al., 2020). While reports suggest a direct association between variables measuring contagion risk (such as time spent with COVID-19 patients) and scores in mental health scales (measuring symptoms of depression, anxiety, stress, and sleeping problems) (Alonso et al., 2020; García-Fernández et al., 2020), salient mental health outcomes, such as suicidal ideation, and important variables that may explain this association, such as infection concerns, remain roughly unexplored. Moreover, little is known regarding the impact of stressors related to organizational changes on HCWs' mental wellbeing. In Spain, only one study focused on the association between reported access to personal protective equipment and psychological distress (acute stress symptoms) (Gonzalo et al., 2021), and no study has yet explored the mental health impact of treatment prioritization practices, despite substantial evidence that peak acute and critical care demands have outpaced capacity in most COVID-19 hotspots (Martínez-Alés et al., 2020), forcing healthcare providers to triage patients' access to limited life-support resources (Azoulay et al., 2020).

Here, we used a large sample of Spanish HCWs to explore the association between three work-related stressors (reported access to personal protective equipment, changes in comparison to usual job functions, and decision-making regarding patient prioritization practices) and (1) fear of contagion and (2) several mental health outcomes, including psychological distress, symptoms of depression, and suicidal thoughts.

1. Methods

1.1. Study design, participants, and variables

This cross-sectional study is part of a prospective global mental health initiative, namely The COVID-19 HEalth caRe wOrkErS (HEROES) Study (NCT04352634). Baseline procedures were conducted in three Spanish regions (Madrid, Andalusia, and Murcia) between April 24th and June 22nd, 2020.

Participants were a non-probabilistic sample of HCWs from different outpatient and inpatient healthcare facilities. In short, we contacted key

stakeholders from healthcare facilities located in each region, including hospital managers, clinical unit supervisors, heads of worker unions, and human resources directors; they forwarded the survey link to all workers. This approach was augmented by allowing workers to forward the survey to their peers, to enhance the response rate. Eligibility criteria were being ≥ 18 years old and employed in a healthcare facility. Potential respondents were asked if they worked in a healthcare facility; otherwise, the survey was stopped immediately. We used e-mail addresses and phone numbers to detect duplicate records and send reminders and follow-ups.

Sociodemographic and work-related variables included age, gender (binary), type of job (physicians, nurses and nurse technicians, other health workers, administration staff, ancillary workers, management, socio-community workers, and other jobs), type of facility (hospital and non-hospital), type of facility financing (public vs. private), work position (frontline vs. non-frontline), reported access to personal protective equipment (sufficient/somewhat sufficient vs. insufficient/very insufficient), decision making on patient prioritization (yes/no) and change in job functions (yes/no). Fear of contagion was measured by two 4-point Likert-type items developed *ad hoc*. The first one assessed fear of getting infected and the second one assessed fear of infecting loved ones. Mental health outcomes included death wishes (i.e., having wished to be dead) and active suicidal ideation (i.e., having thought about killing oneself) as measured by the Spanish version of the Columbia Suicide Severity Rating Scale (C-SSRS) (Al-Halabi et al., 2016); depressive symptoms as measured by the Spanish version of the 9-item Patient Health Questionnaire (PHQ-9) (Diez-Quevedo et al., 2001); and psychological distress as measured by the Spanish version of the 12-item General Health Questionnaire (GHQ-12) (Sánchez-López et al., 2008). We used widely accepted thresholds for detecting people screening positive for depression (PHQ-9 score higher than 9 points) (Manea et al., 2012) and for psychological distress (GHQ-12 higher than 2 points) (Domínguez-Salas et al., 2020; Goldberg et al., 1997). Cronbach's alphas were 0.88 (95%CI: 0.87, 0.89) for the PHQ-9 and 0.86 (95%CI: 0.85, 0.87) for the GHQ-12.

1.2. Statistical analyses

All analyses were conducted using the packages "summarytools", "psych", "tidyverse", "lme4" and "ggplot2" in R Studio for Mac (Version 1.2.5042). First, we detected 95 participants who did start the survey (i.e., gave informed consent) but left before item #1, probably due to technical problems with the online platform, and removed them. Second, we reported categorical variables as frequencies and valid percentages and continuous variables as mean/median and standard deviations for the whole sample and stratified by reported access to personal protective equipment, decision making on patient prioritization and change in job functions. Third, we tested if depressive symptoms, psychological distress, death wishes, fear of getting infected, and fear of infecting loved ones could be explained by three job-related variables: reported access to personal protective equipment, decision making on patient prioritization, and change in job functions. To that end, we conducted mixed-effects linear regression models on depressive symptoms, psychological distress, fear of getting infected and fear of

infecting loved ones, and mixed logistic regression models on suicidal ideation. We controlled for age, gender, and work position (frontline vs. non-frontline) as level-1 correlates, and for region as level-2 correlate (a Direct Acyclic Graph is shown in Supplementary Figure 1). Finally, we estimated the association between previous history of mental health problems and the five outcomes of interest, and repeated our mixed models after inclusion of previous history of mental health problems as a confounder when appropriate. Results were presented as betas (Bs) and odds ratios (ORs) with 95% confidence intervals.

All procedures comply with the Helsinki Declaration of 1975, as revised in 2013. The study has the approval of the Hospital Universitario La Paz Ethics Committee (Madrid, Spain).

2. Results

We included 2370 respondents between April 24th–June 22nd, 2020 (see Supplementary Figure 2 for an overview of contemporary COVID-19 epidemiological indicators Spain). Overall, 75% ($n = 1786$) completed the survey, with a median response time of 19 min. There were roughly no differences between completers and non-completers in terms of years of age (completers:41.9, non-completers:42.1) and gender (completers:77% women; non-completers:82% women). Most missing data pertained to the last section of the questionnaire, suggesting that missingness was largely at random, driven by survey extension (Supplementary Figure 3). However, a higher proportion of men completed the mental health outcome measures than women. The response rate could not be estimated as (1) most facilities were overwhelmed by the epidemic peak and could not provide a precise list of potential participants and (2) respondents could avoid reporting their workplace for privacy reasons.

Participants' characteristics are presented in Table 1. Most

participants were women and median age was 41 years. One out of three were frontline HCWs and one third worked in a hospital facility. The vast majority came from facilities with public funding. More than three fourths of the respondents were physicians and nurses or nurse technicians (Supplementary Table 1 describes the sample by job category). Regarding mental health outcomes, 1410 (74%) people screened positive for psychological distress on the GHQ-12 and 501 (27%) for probable depression on the PHQ-9. Seven percent ($n = 127$) reported death wishes and 21 (17%) of them reported active suicidal ideation. On a 4-point Likert scale, scores were higher when asked about fear of infecting their loved ones than when asked about getting infected themselves.

Table 2 summarizes results from regression analyses. People were more likely to report symptoms of depression and psychological distressed if they reported reduced access to personal protective equipment, had to make decisions about patient prioritization, or were redeployed to positions different from their usual job functions. Death wishes were also more frequent among those who changed their job functions. Prior history of mental health problems was associated in adjusted models with the PHQ-9 total score ($B = 3.9$, 95%CI: 2.9, 4.9), the GHQ-12 total score ($B = 1.4$, 95%CI: 0.8, 2.0), and the probability of reporting death wishes ($OR = 3.9$, 95%CI: 2.3, 6.3), but not with the fear of getting infected ($B = -0.03$, 95%CI: -0.19, 0.13) or the fear of infecting relatives and friends ($B = -0.06$, 95%CI: -0.22, 0.09). Inclusion of prior history of mental health problems as a confounder in sensitivity analyses did not change effect estimates (Supplementary Table 2).

3. Discussion

In this study, based on a large sample of Spanish HCWs surveyed during the first peak of the COVID-19 pandemic, we found that three

Table 1

Respondents' characteristics and mental health outcomes by reported access to personal protective equipment, decision making on patient prioritization and change in job functions.

	All	Access to protective equipment		Decision making on patient prioritization ^a		Change in job functions	
		Yes	No	No	Yes	No	Yes
Age, M (SD)	41.9 (11.7)	42.9 (11.5)	40.8 (11.6)	42.0 (11.4)	36.3 (10.5)	45.1 (11.4)	38.4 (11.0)
Gender, n (%) ^b							
Female	1831 (78)	689 (45)	856 (55)	819 (79)	213 (21)	884 (51)	856 (4)
Male	505 (22)	232 (51)	220 (49)	250 (75)	82 (25)	273 (57)	210 (43)
Facility							
Non-hospital	751 (33)	288 (44)	364 (56)	377 (89)	49 (11)	445 (60)	297 (40)
Hospital	1495 (67)	629 (47)	710 (53)	694 (74)	247 (26)	714 (48)	771 (52)
Facility financing							
Public	2103 (94)	854 (46)	999 (54)	1998 (78)	279 (22)	1075 (52)	997 (48)
Private	144 (6)	50 (48)	65 (52)	59 (81)	14 (19)	72 (52)	67 (48)
Frontline HCW							
No	602 (34)	283 (51)	275 (49)	293 (88)	31 (12)	374 (62)	226 (38)
Yes	1181 (66)	487 (45)	595 (55)	583 (71)	240 (29)	529 (45)	644 (55)
Region							
Madrid	967 (41)	355 (44)	452 (56)	374 (68)	178 (32)	358 (40)	540 (60)
Andalusia	815 (34)	316 (46)	470 (54)	386 (84)	67 (17)	50 (65)	273 (35)
Murcia	360 (15)	152 (48)	164 (51)	204 (92)	17 (8)	180 (52)	167 (48)
Other	228 (10)	99 (52)	93 (48)	107 (81)	25 (19)	116 (54)	100 (46)
Depression (PHQ-9)							
Overall score (0–27), M (SD)	7.7 (5.4)	6.3 (5.0)	7.9 (5.4)	6.9 (5.0)	9.2 (5.4)	6.6 (5.2)	8.2 (5.5)
Probably depressed, n (%)	501 (27)	167 (37)	283 (63)	235 (68)	110 (32)	213 (43)	287 (57)
Psychological distress (GHQ-12)							
Overall score (0–12), M (SD)	5.2 (3.4)	4.5 (3.3)	5.6 (3.4)	4.9 (3.4)	6.5 (3.1)	4.6 (3.4)	5.8 (3.3)
Probably distressed, n (%)	1410 (74)	554 (42)	755 (58)	700 (74)	246 (26)	659 (47)	746 (53)
Death wishes (C-SSRS), n (%)	127 (7)	46 (40)	69 (60)	60 (73)	22 (27)	51 (40)	75 (60)
Fear of getting infected (1–4), Me	3	2	3	3	3	3	3
Fear of infecting loved ones (1–4)	4	3	4	4	3	3	4

Note.

HCW = healthcare worker, PHQ-9 = Patient Health Questionnaire – 9 items, GHQ-12 = General Health Questionnaire – 12 items, C-SSRS = Columbia – Suicide Severity Rating Scale.

^a Prioritization section shown to physicians and clinical managers only.

^b All percentages are valid percentages. Missing data differ throughout survey sections section because some of the respondents left the survey or skipped certain items.

Table 2

Association between work-related stressors and mental health outcomes (PHQ-9, GHQ-12, and C-SSRS) and fear of infection.

	Depression (PHQ-9)	Psychological distress (GHQ-12)	Death wishes (C-SSRS)	Fear of getting infected	Fear of infecting loved ones
	B (95% CI) ^a	B (95% CI) ^a	OR (95% CI) ^a	B (95% CI) ^a	B (95% CI) ^a
Access to protective equipment	1.3 (0.7, 1.8)	1.0 (0.7, 1.3)	1.6 (0.6–4.1)	0.2 (0.1, 0.3)	0.2 (0.1, 0.3)
Decision making on patient prioritization ^b	1.8 (1.0, 2.5)	1.0 (0.5, 1.5)	1.3 (0.8–2.4)	−0.1 (−0.2, 0.1)	−0.2 (−0.3, −0.1)
Change in job functions	1.0 (0.5, 1.6)	0.8 (0.4, 1.1)	1.8 (1.2–2.8)	0 (−0.1, 0.1)	−0.1 (−0.1, 0)

work-related stressors, namely reported access to personal protective equipment, changes in job functions, and decision-making regarding patient prioritization, were directly associated with depressive symptoms, psychological distress and death wishes - after adjusting for individual- and region-level potential sources of confounding.

Our estimates that 74% and 27% respondents screened positive for psychological distress and probable depression, respectively, and 7% reported death wishes are in line with reports from comparable studies examining HCWs from initial COVID-19 hotspots (Mortier et al., 2021; Pappa et al., 2020; Santabábara et al., 2021). Notably, respondents reported higher fear of infecting their loved ones than of infecting themselves.

By providing the first estimates of the impact of modifiable work-related stressors on HCWs' mental wellbeing, our results add to substantial evidence documenting the physical and mental health toll that the early phases of the pandemic took on HCWs (Alonso et al., 2020; García-Fernández et al., 2020; Gonzalo et al., 2021; Ministerio de Sanidad, 2020). In addition, self-reported prior history of mental health problems stood out as an important predictor for adverse mental health outcomes, in line with previous research (Alonso et al., 2020). The public health implications of our findings seem straightforward. First, workplace prevention strategies for HCWs should (1) ensure adequate access to personal protective equipment during pandemic peaks, (2) minimize changes in job functions if HCW redeployment is required, and (3) favor the implementation of publicly available criteria for patient triage and on-call bioethics committees if imbalances between needs and availability of clinical resources arise, force patient prioritization. Second, the high prevalence of psychological distress, depressive symptoms, and death wishes highlights the importance of offering easy access stepped-care, evidence-based mental health treatment to HCWs – especially in presence of previous history of mental health problems.

3.1. Limitations and conclusions

In line with most studies conducted during the initial COVID-19 outbreak, the validity of our findings may be somewhat hindered by a non-probabilistic sampling approach (Griffith et al., 2020). Notably, some data indirectly suggest that our study population was nonetheless reasonably representative of all HCWs: the prevalence of depressive symptoms and psychological distress in our sample were in keeping with contemporary unselected samples of Spanish HCWs (Alonso et al., 2020) and of Spain's general population (Domínguez-Salas et al., 2020); and the rate of suicidal wishes was comparable to that of a large study conducted on Chinese HCWs in February 2020 (Cai et al., 2020). In addition, our cross-sectional design does not preclude the presence of some degree of reverse causation in the studied associations, and we cannot rule out certain residual confounding. Last, we used a simplified causal framework to guide our analytic decisions: the causal pathways leading to fear of contagion and to development of mental symptoms may be somewhat different, and fear of contagion may mediate the development of mental symptoms. Future analyses will include formal mediation assessments including these variables measured at different time points, building on the longitudinal nature of the HEROES initiative. In conclusion, these findings expand the still scarce literature on how organizational changes driven by the pandemic may have impacted

HCWs' mental wellbeing. Our results should inform healthcare management decision makers in future pandemic peaks and healthcare crises.

Author statement

This work has not been published previously in any form and is not under consideration for publication in any other journal.

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CRediT authorship contribution statement

Roberto Mediavilla: Investigation, Data curation, Writing – original draft. **Eduardo Fernández-Jiménez:** Investigation, Writing – original draft. **Gonzalo Martínez-Alés:** Investigation, Formal analysis, Writing – original draft. **Berta Moreno-Küstner:** Writing – original draft. **Irene Martínez-Morata:** Supervision. **Fabiola Jaramillo:** Supervision. **Inés Morán-Sánchez:** Supervision. **Sergio Minué:** Supervision. **Alberto Torres-Cantero:** Supervision. **Rubén Alvarado:** Investigation. **José Luis Ayuso-Mateos:** Supervision. **Franco Mascayano:** Investigation. **Ezra Susser:** Investigation. **María-Fe Bravo-Ortiz:** Investigation.

Declaration of Competing Interest

None

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.jad.2021.08.059](https://doi.org/10.1016/j.jad.2021.08.059).

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