Symptoms of Anxiety, Depression, and Peritraumatic Dissociation in Critical Care Clinicians Managing Patients with COVID-19. A Cross-Sectional Study

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ORIGINAL ARTICLE

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A Cross-Sectional Study

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Abstract

Rationale: Frontline healthcare providers (HCPs) during the coronavirus disease (COVID-19) pandemic are at high risk of mental morbidity.

Objectives: To assess the prevalence of symptoms of anxiety, depression, and peritraumatic dissociation in HCPs.

Methods: This was a cross-sectional study in 21 ICUs in France between April 20, 2020, and May 21, 2020. The Hospital Anxiety and Depression Scale and the Peritraumatic Dissociative Experience Questionnaire were used. Factors independently associated with reported symptoms of mental health disorders were identified.

Measurements and Main Results: The response rate was 67%, with 1,058 respondents (median age 33 yr; 71% women; 68% nursing staff). The prevalence of symptoms of anxiety, depression, and peritraumatic dissociation was 50.4%, 30.4%, and 32%, respectively, with the highest rates in nurses. By multivariable analysis, male sex

was independently associated with lower prevalence of symptoms of anxiety, depression, and peritraumatic dissociation (odds ratio of 0.58 [95% confidence interval, 0.42–0.79], 0.57 [95% confidence interval, 0.39–0.82], and 0.49 [95% confidence interval, 0.34–0.72], respectively). HCPs working in non–university-affiliated hospitals and nursing assistants were at high risk of symptoms of anxiety and peritraumatic dissociation. Importantly, we identified the following six modifiable determinants of symptoms of mental health disorders: fear of being infected, inability to rest, inability to care for family, struggling with difficult emotions, regret about the restrictions in visitation policies, and witnessing hasty end-of-life decisions.

Conclusions: HCPs experience high levels of psychological burden during the COVID-19 pandemic. Hospitals, ICU directors, and ICU staff must devise strategies to overcome the modifiable determinants of adverse mental illness symptoms.

Keywords: coronavirus; ICU; pneumonia; depression; anxiety

At a Glance Commentary

Scientific Knowledge on the Subject: Frontline healthcare providers (HCPs) managing patients with coronavirus disease (COVID-19) exhibit a high prevalence of symptoms of mental health disorders. However, data on critical care HCPs are scarce. Moreover, no study has focused on factors associated with psychological burden that may be amenable to change, thus enabling the development of strategies to preserve mental well-being and to prevent mental morbidity.

What This Study Adds to the Field: Symptoms of anxiety, depression, and peritraumatic dissociation were found in 50.4%, 30.4%, and 32% of the respondents, respectively, with the highest prevalence in nursing assistants and nurses. Fear of being infected, inability to care for one's own family, inability to rest, struggling with difficult emotions, experiencing regret about restricted visitation policies, and witnessing hasty end-of-life decisions were independently associated with the presence of psychological burden. Interventions targeting these modifiable factors may help with the early detection and prevention of mental morbidity among critical care HCPs managing patients with COVID-19.

Critical care healthcare providers (HCPs) have been in the frontline since the beginning of the coronavirus disease (COVID-19) pandemic (1). Preserving their mental health is of paramount importance, and several interventions might help to mitigate their psychological burden (2, 3). Studies outside the critical care setting have shown a high prevalence of insomnia, anxiety, and depression in HCPs managing patients with COVID-19 (4). A single survey collected data from critical care

HCPs (5). In the 34 ICUs in China, symptoms of anxiety and depression affected up to half the ICU staff, with nurses, women, frontline HCPs, and HCPs working in Wuhan, China, experiencing more severe degrees of psychological burden (5). However, the study did not focus on the determinants of psychological burden that may be amenable to change and would thereby allow hospitals to devise strategies that preserve well-being and prevent adverse mental outcomes among HCPs (6).

Identifying risk factors for anxiety and depression in large numbers of HCPs is paramount to allow risk stratification and referral of the highest-risk professionals to the appropriate level of care. When screening strategies with appropriate referrals are already in place, in the event of a crisis, there is less risk of underestimating symptoms as inevitable benign reactions. Because psychological burden is highly prevalent in frontline HCPs, notably those working in ICUs, studies are needed to help design preventive strategies for use in the event of a health crisis. Safeguarding frontline HCPs is a priority not only at the individual level but also at the collective level, as HCPs are among the most precious resources during a surge in disease, as illustrated during the current COVID-19 pandemic (4, 7).

Organizational-level interventions that improve work control and emphasize quality, cohesion, communication, and values may improve clinician satisfaction, stress, and retention. Implementing such interventions was a major priority before the COVID-19 pandemic and may be even more crucial now. To assess the prevalence and determinants of symptoms of anxiety, depression, and peritraumatic dissociation in critical care HCPs, we performed a cross-sectional study in nurses, nursing assistants, senior physicians, residents, medical students, and allied health professionals widely exposed to the COVID-19 pandemic, working in 21 ICUs.

Methods

The ethics committee of the Institutional Review Board Sud Méditerranée (2020-A00809-30; Insitutional Review Board, 20.03.27.73019) approved this cross-sectional study on March 31, 2020. The survey was sent to all bedside HCPs working in the ICUs that are part of the FAMIREA study group in France (8). The HCPs were invited to complete the online survey confidentially between April 20 and May 21. Only the 21 ICUs of our study group that admitted patients with COVID-19 were included.

The Survey Questionnaire

The variables reported in tables and figures were collected online. The questionnaire was built in a timely manner to allow us to capture data at the time of the surge. The study started 20 days after the peak of the pandemic in France, at a time when the participating ICUs had more than 50% of patients with COVID-19. The questionnaire included five components that were identified from a literature review and semistructured interviews with nurses, nursing assistants, senior physicians, and residents. These components were *1)* exposure to COVID-19 (number of patients managed and infected people surrounding the respondents, such as colleagues and family or friends), *2)* patient management (technical and emotional aspects, decision-making, and visitation policies), *3)* professional and personal impact of the pandemic (relationships at work, support from colleagues and from the institution, organizational factors, ability to rest, family balance, and ability to care for family), *4)* personal information (demographics and habits regarding alcohol, tobacco, and psychotropic drugs), and *5)* two scales (Hospital Anxiety and Depression Scale [HADS] and Peritraumatic Dissociation Questionnaire [PDEQ]). The questionnaire was prepared by the qualitative research team of the FAMIREA group, led by N.K.-B., and was read and edited by each investigator

(one nurse or one physician at each participating ICU), with changes made accordingly. The revised questionnaire was then read and edited by physicians and nurses at three ICUs, with changes or clarification made for some items. Then, information about the survey was sent to all HCPs working in the participating ICUs through mailing lists (three emails in all), WhatsApp groups (three messages), a poster with quick response codes in each ICU, and local interventions by study investigators. The HADS was chosen because it facilitates the detection and management of emotional disorders, notably symptoms of anxiety and depression (9). The HADS has already been used in a large sample of employees (10, 11). The PDEQ (12) was selected because it assesses peritraumatic reactions and reliably quantifies the likelihood of acute and chronic post-traumatic stress disorder symptoms. The HADS is a 14-item self-assessment questionnaire that includes a seven-item subscale for anxiety and a seven-item subscale for depression that are each scored on a four-point scale. The HADS is reliable for detecting states of depression and anxiety, with the two subscales being valid measures of the severity of the emotional disorder. A cutoff score >7 was used for each subscale for detecting symptoms of anxiety or depression. The PDEQ is a 10-item self-report instrument scored on a five-point scale. It includes two different constructs, namely, impaired awareness (i.e., alterations in perception that reflect narrowed attention during heightened arousal) and derealization or depersonalization (i.e., responses that involve altered experiences of oneself or one's environment) (13). A cutoff score >15 was used for detecting symptoms of peritraumatic dissociation.

For variables depicting the COVID-19 experience, the responses were either binary (yes or no) or made on a 0–10 visual analog scale (VAS) (i.e., for the fear of being infected or of infecting others). VASs are convenient, easy, and rapid to administer and have been proved reliable for measuring characteristic, subjective phenomena or attitudes that are believed to range across a continuum of values and cannot easily be directly measured. Fear was identified through qualitative interviews as a major domain, as was the

Table 1. Respondents' Characteristics and Reports about the COVID-19 Experience

Respondents' Characteristics (N = 1,058)	Results
Age, yr, median (IQR)	33 (28–41)
Sex, F, n (%)	753 (71.0)
Role in the ICU, n (%)	
Nurse	498 (47.2)
Nursing assistant	223 (21.1)
Senior physician	204 (19.3)
Resident	78 (7.4)
Medical student	25 (2.4)
Other allied professionals*	27 (2.6)
ICU experience, yr, median (IQR)	5 (2–10)
Number of hours worked per week, median (IQR)	45 (36–60)
Use of psychotropic drugs before the pandemic, n (%)	54 (5.2)
Increased use or new intake of psychotropic drugs since the pandemic[†], n (%)	245 (23.7)
Rank from 0 (no, not at all) to 10 (yes, very much), median (IQR)	
Personal investment during the pandemic 0 (very limited) to 10 (maximal)	5 (5–7)
The COVID-19 experience was technically more difficult	7 (5–8)
The COVID-19 experience was emotionally more difficult	7 (5–8)
Institutional support was very strong	7 (5–8)
Public support was very strong	5 (3–7)
The COVID-19 experience strengthened relationships with other departments	7 (5–8)
The COVID-19 experience strengthened relationships with nurses	8 (6–8)
The COVID-19 experience improved communication among the ICU team	5 (4–7)
The COVID-19 experience improved intrateam safety	7 (5–8)
Respondents reported being proud of having worked during this pandemic	8 (6–9)
Respondents reported that COVID-19 was a very exciting period	4 (2–6)
Respondents reported struggling with their emotions	4 (2–6)
Reported feelings and experiences during and since the pandemic, n (%)	
Respondents expressed a need for public gratitude	874 (83.0)
Respondents were pleasantly surprised by colleagues' behaviors	557 (53.1)
Respondents expressed sadness	523 (49.6)
Respondents reported they witnessed hasty end-of-life decisions	446 (42.2)
Respondents reported insomnia	397 (37.8)
Respondents reported they believed they were part of a healthcare elite	380 (36.1)
Respondents regret the restricted visitation policies for relatives during the pandemic	333 (31.5)
Respondents reported euphoria and exaltation	126 (11.9)
Respondents reported hyperactivity and high self-esteem	115 (10.9)
Respondents requested psychological support	70 (6.6)
Could rest during the pandemic, n (%)	
Not at all	240 (22.9)
From time to time	528 (50.3)
Very often	282 (26.9)
Could care for my family during the pandemic, n (%)	
Not at all	230 (21.9)
From time to time	484 (46.2)
Very often	334 (31.9)

Definition of abbreviations: COVID-19 = coronavirus disease; IQR = interquartile range.
*Includes physiotherapists, psychologists, and nutritionists.
[†]Includes tobacco, alcohol, cannabis, cocaine, or other drugs.

case during the 2013–2016 West Africa Ebola virus disease outbreak (14).

Study Outcomes

Mental health symptoms included anxiety, depression, and peritraumatic dissociation, which were defined by a score greater than the above-mentioned cutoffs.

Statistical Analysis

Data are described as median and interquartile range (IQR) or as number and percentage. Categorical variables were compared using Fisher exact test, and continuous variables were compared using the nonparametric Wilcoxon test, Mann-Whitney test, or Kruskal-Wallis test. The Friedman test was used to compare continuous variables across the several patient groups.

Independent predictors for anxiety, depression, and peritraumatic dissociation were assessed using logistic regression and mixed logistic models. First, a logistic regression model was built. Variables of interest were selected according to their relevance and statistical significance in univariate analysis. We used conditional stepwise regression with 0.2 as the critical P value for entry into the model and 0.1 as the P value for removal. Interactions and correlations between the explanatory variables were carefully checked. Continuous variables for which log-linearity was not confirmed were transformed into categorical variables according to median or IQR. Last, a mixed model was performed using the variables previously selected, using respondent centers as random effect on the intercept. This model (adjusting for center effect) is reported in the manuscript. All models were assessed for calibration and discrimination. Residuals were plotted, and the distributions were inspected. In the final models, it was preplanned to force any clinically relevant variables that were not selected. If performed, results of such *post hoc* analyses were planned to be adequately underlined and reported as sensitivity analyses. We did not perform statistical adjustments for multiple comparisons.

All tests were two sided, and P values less than 0.05 were considered statistically significant. Analyses were done using R software version 3.6.2 (https://www.r-project.org), including lme4 and lmerTest packages.

Results

Respondents

Among the 1,580 bedside HCPs working in the 21 participating ICUs, 1,058 (67%) fully completed the survey. The number of respondents was 47 (IQR, 32–66) per hospital. Sixteen (76.2%) ICUs were university affiliated. The median number of beds per ICU was 20 (IQR, 15–25) before the pandemic and 32 (IQR, 26–37) during the surge (*see* Table E1 in the online supplement). The total number of patients with COVID-19 managed was 478 per ICU [IQR, 350–780]. The proportion of professionals infected in the 21 ICUs was 6.2% (98 of 1,580). As shown in Table 1, the median age of the respondents was 33 (IQR, 28–41) years, and 71% were women. Among the respondents, 721 (68.3%) were part of the nursing staff (498 nurses, 10 head nurses, and 213 nursing assistants), 29.1% were physicians (204 senior intensivists, 78 residents, and 25 medical students), and 2.6% were other allied professionals (22 physiotherapists and five psychologists). Eighty-four (8%) HCPs had been infected by COVID-19 themselves, and 897 (84.8%) had a colleague who had been infected, including 59 (5.6%) who had a colleague who died of the disease. Moreover, 427 (40.4%) had a family member who was infected, including 120 (11.3%) who needed hospitalization and 41 (3.9%) who died of COVID-19. Among respondents, 5.2% were receiving psychotropic drugs before the pandemic, and 245 (23.7%) reported starting or increasing tobacco, alcohol, cannabis, cocaine, or other drugs during the pandemic.

Respondents' Experience Assessed Using VAS Scores

Most elements of the COVID-19 experience were negative. The respondents indicated that the COVID-19 experience was particularly difficult, both technically and emotionally (median VAS score, 7; IQR, 5–8 for both questions). They reported having fear of being infected (5; IQR, 3–7), of infecting family and friends (8; IQR, 6–9), or colleagues (5; IQR, 3–7). Some respondents struggled to cope with their emotions (4; IQR, 2–6). Among the respondents, 42.2% reported witnessing hasty end-of-life decisions, and 31.5% regretted the restricted visitation policies

for relatives. Half the respondents reported sadness and 37.8% reported insomnia, but only 6.6% requested psychological support. Furthermore, 22.9% of respondents were completely unable to rest during the surge, and half could rest only from time to time. Similarly, 21.9% could not provide any care to their own family during the surge, whereas 46.2% were able to care for their own family only from time to time.

Support was an important consideration. Many respondents believed that the pandemic strengthened relationships with other hospital departments (7; IQR, 5–8) and with nurses (8; IQR, 6–8). Interestingly, institutional support was ranked at 7 (IQR, 5–8) but public support only at 5 (IQR, 3–7), whereas 83% of respondents expressed a need for public gratitude. Finally, 53.1% were pleasantly surprised by colleagues' behaviors during the pandemic.

Some respondents experienced positive feelings, such as being proud of working during the pandemic (8; IQR, 6–9) or perceiving the surge as an exciting period. In addition, 36.1% of respondents believed they were part of a healthcare elite, 11.9% reported euphoria and exaltation, and 10.9% experienced hyperactivity and high self-esteem.

HADS and PDEQ Results

Symptoms of anxiety, depression, and peritraumatic dissociation were found in 533 (50.4%), 322 (30.4%), and 340 (32%) respondents, respectively. As shown in Table 2 and Figure 1, the prevalence of these symptoms varied significantly across the different HCP types, with nursing assistants exhibiting the highest prevalence of symptoms of anxiety (62.1%), depression (40.6%), and peritraumatic dissociation (46%). Compared with female sex, male sex was associated with a significantly lower prevalence of symptoms of anxiety (39% vs. 55.1%; $P < 0.0001$), depression (21.3% vs. 34.1%; $P < 0.0001$), and peritraumatic dissociation (19% vs. 37.4%; $P < 0.0001$). Figure 2 displays the association between fear of COVID-19 infection and the presence of psychological burden (Table E2). Strong fear as indicated by a high score on the 0–10 VAS was associated with the highest prevalence of anxiety, depression, and peritraumatic dissociation. These symptoms were also significantly increased when respondents reported not having time

Table 2. Symptoms of Anxiety, Depression, and Peritraumatic Dissociation among the Respondents

	Nurses (n = 498)	Nursing Assistants (n = 223)	Senior Physicians (n = 204)	Residents (n = 78)	Medical Students (n = 25)	Other Allied Professionals (n = 27)
HADS anxiety subscale, median (IQR)	7 (5–10)	8 (5–10)	6 (4–8)	6 (4–8)	5 (3–8)	5 (3–8)
Symptoms of anxiety, %	50	62.1	46.6	41	36	35.7
HADS depression subscale, median (IQR)	5 (2–8)	6 (3–8)	4 (2–6)	4 (2–6)	3 (0.75–5)	3 (2–5)
Symptoms of depression, %	31.6	40.6	25	19.2	12	21.4
PDEQ, median (IQR)	13 (11–17)	14 (11–19)	11 (10–14)	11 (10–13)	14 (11–17)	11 (10–14)
Symptoms of peritraumatic dissociation, %	34	46	20	15.4	40	25

Definition of abbreviations: HADS = Hospital Anxiety and Depression Scale; IQR = interquartile range; PDEQ = Peritraumatic Dissociation Questionnaire. All respondents, $N = 1,058$. A cutoff score >7 was used for each of the HADS subscales for detecting symptoms of anxiety or depression. A cutoff score >15 was used for the PDEQ for detecting symptoms of peritraumatic dissociation.
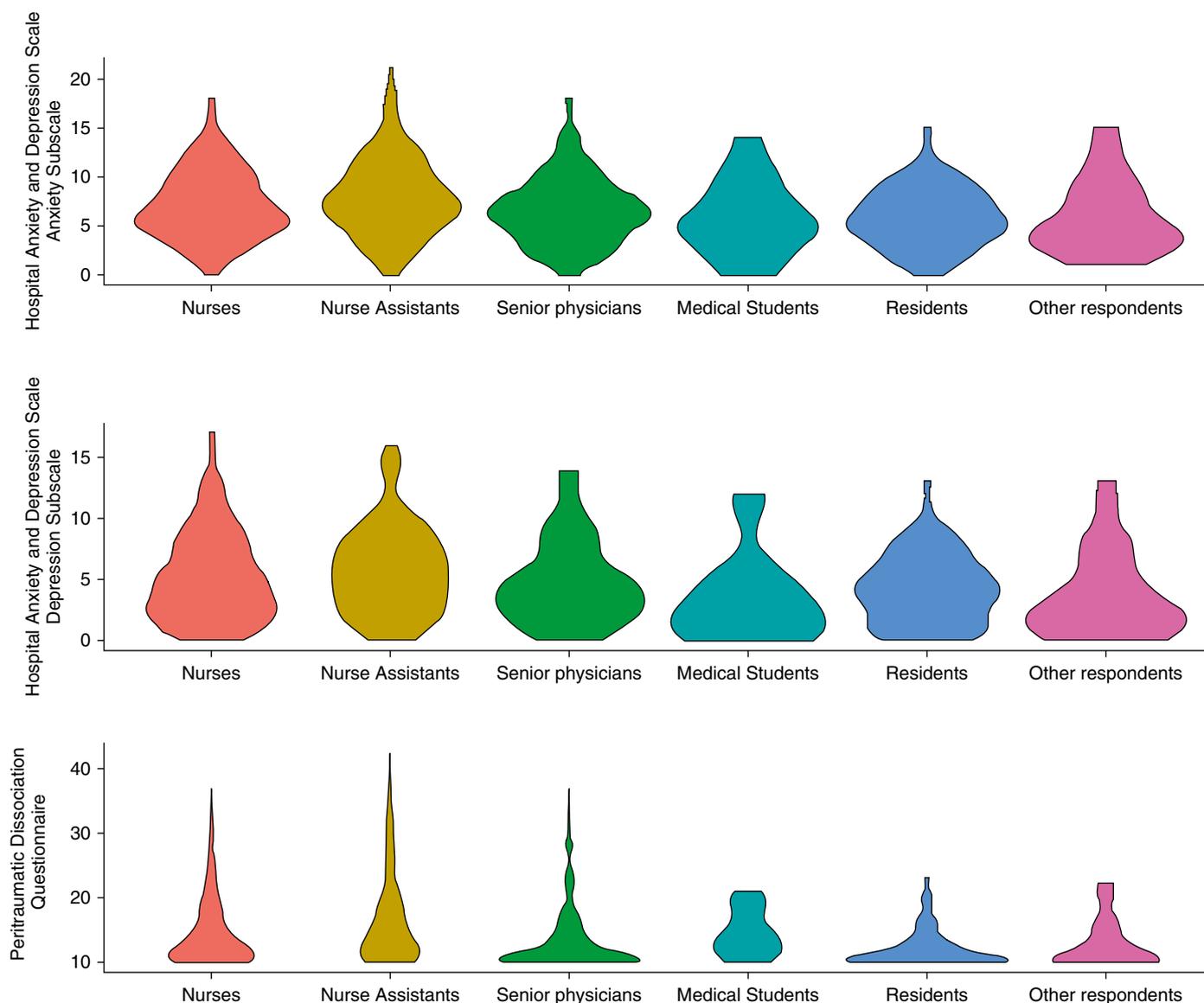
Figure 1. Violin plots depicting the probability density of anxiety, depression, and peritraumatic dissociation across different categories of healthcare providers.
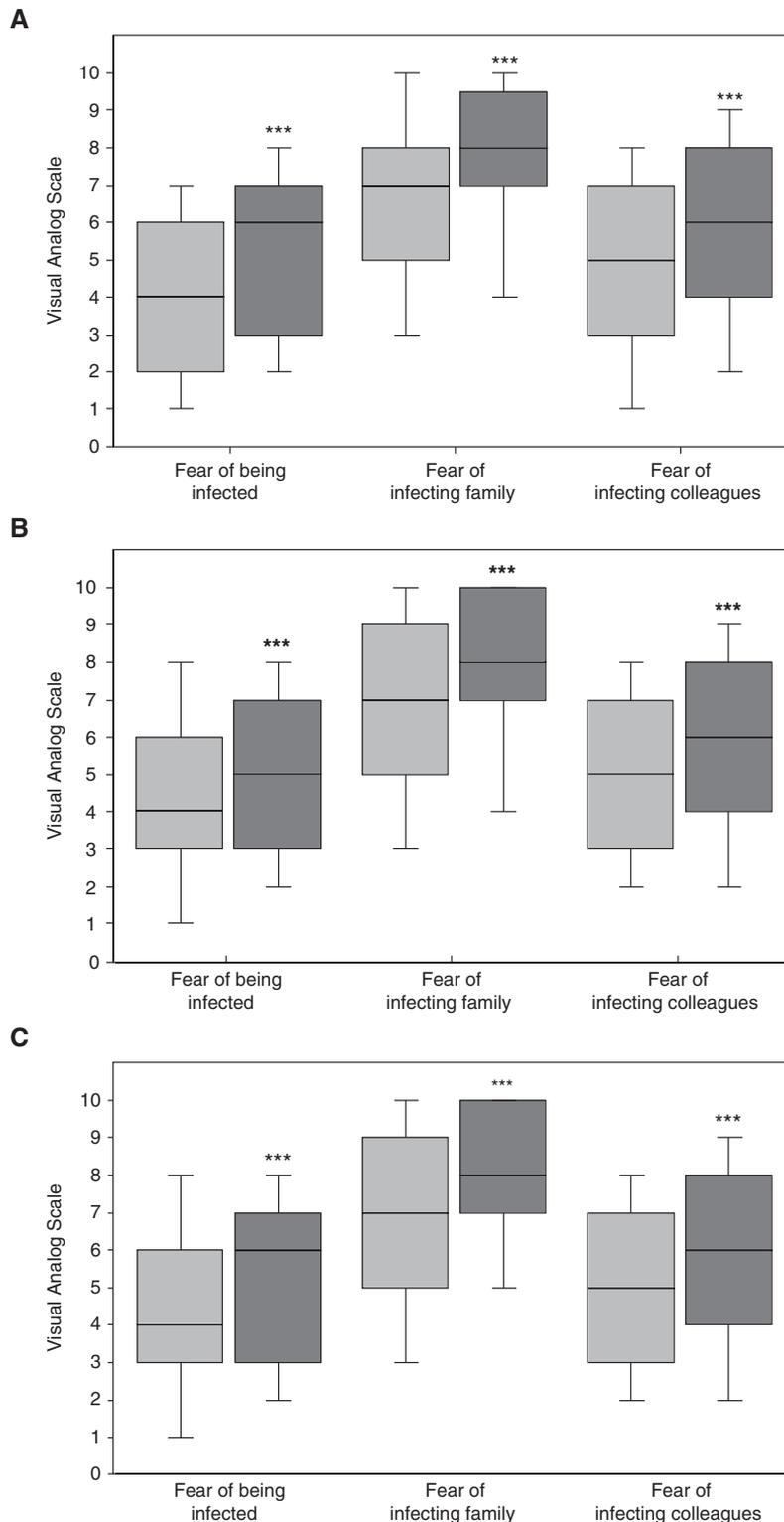
Figure 2. Box plots depicting respondents' fear of coronavirus disease (COVID-19) infection according to the presence of symptoms of (A) anxiety (light gray indicates no symptoms of anxiety, and dark gray indicates presence of symptoms of anxiety), (B) depression (light gray indicates no symptoms of depression, and dark gray indicates presence of symptoms of depression), or (C) peritraumatic dissociation (light gray indicates no symptoms of peritraumatic dissociation and dark gray indicates presence of symptoms of peritraumatic dissociation). ***$P < 0.0001$ between respondents with and without symptoms.

to rest or to care for their own family (Figures 3 and 4).

The use of psychotropic drugs, reported by 54 (5.2%) respondents and was increased in those with symptoms of anxiety (9.1%), symptoms of depression (10.1%), or symptoms of peritraumatic dissociation (9.5%).

Importantly, the number of patients with COVID-19 seen or managed was not associated with symptoms of mental health disorders, and the number of patients with COVID-19 who died was associated only with the presence of symptoms of depression.

Multivariable Analysis

As shown in Table 3, by multivariable analysis, male sex was independently associated with a decreased prevalence of symptoms of anxiety (odds ratio [OR], 0.58; 95% confidence interval [CI], 0.42–0.79), depression (OR, 0.57; 95% CI, 0.39–0.82), and peritraumatic dissociation (OR, 0.49; 95% CI, 0.34–0.72). Other variables associated with an increased prevalence of all three mental illness symptoms were fear of being infected (OR, 1.21; 95% CI, 1.14–1.28 for anxiety; OR, 1.10; 95% CI, 1.03–1.17 for depression; and OR, 1.09; 95% CI, 1.02–1.16 for peritraumatic dissociation) and ability to rest (ORs for those who could rest very often were 0.29 [95% CI, 0.20–0.44] for anxiety, 0.14 [95% CI, 0.08–0.23] for depression, and 0.46 [95% CI, 0.29–0.73] for peritraumatic dissociation).

Symptoms of anxiety and dissociation were less frequent in university-affiliated hospitals (OR, 0.59; 95% CI, 0.43–0.81 and OR, 0.58; 95% CI, 0.42–0.80), respectively). Being a nursing assistant was significantly associated with symptoms of anxiety (OR, 1.46; 95% CI, 1.03–2.09) and dissociation (OR, 1.20; 95% CI 0.82–1.74), and being a medical student was significantly associated with symptoms of dissociation (OR, 2.98; 95% CI, 1.14–7.82).

Inability to care for one's own family, struggling with emotions, and feeling part of a healthcare elite were associated only with symptoms of dissociation (OR, 0.35; 95% CI, 0.22–0.53) for those who were able to care very often for their family, (OR, 1.16; 95% CI, 1.06–1.27 and OR, 1.54; 95% CI, 1.14–2.08, respectively). Expressing regrets about restricted visitation policies was associated with symptoms of anxiety (OR, 1.39; 95% CI, 1.03–1.86) and

A

B

C
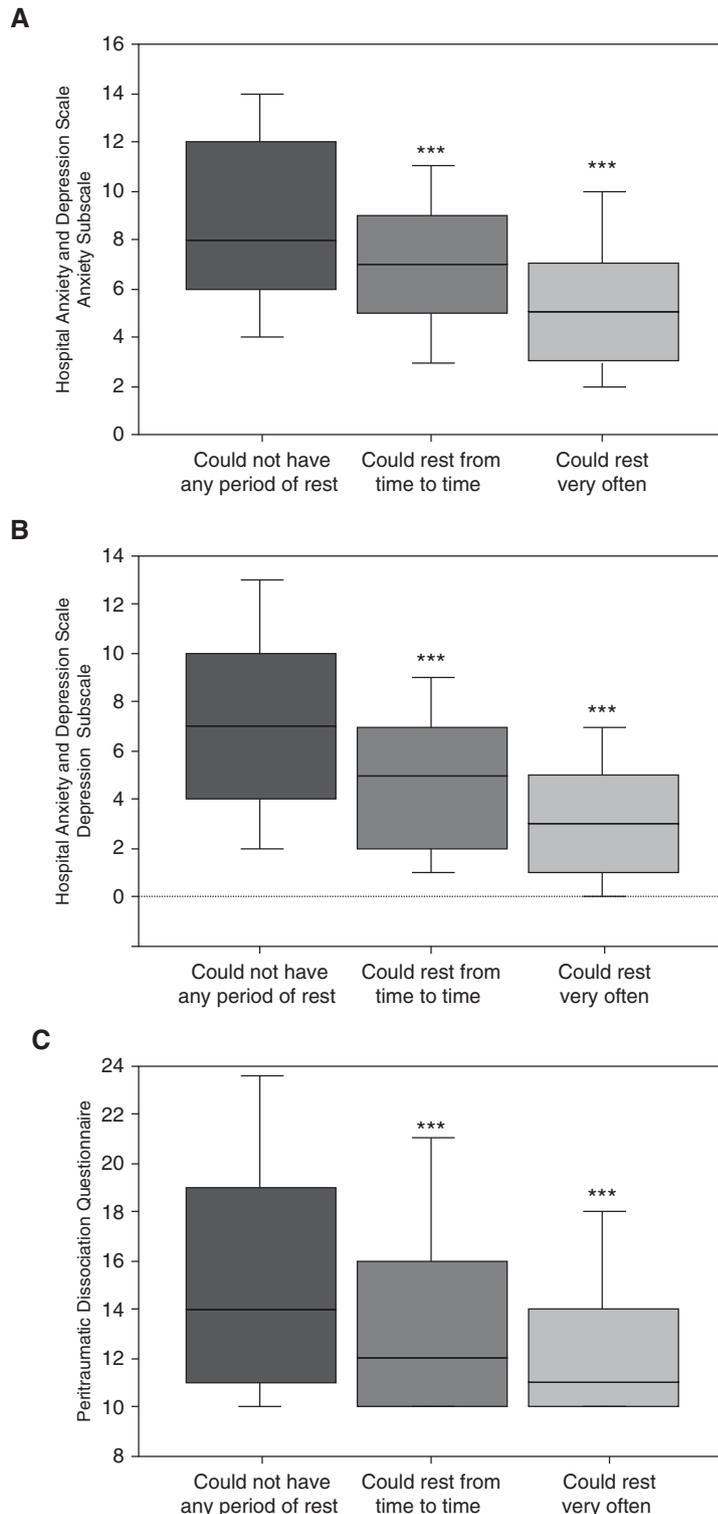
Figure 3. Box plots depicting respondents' (*A*) anxiety (Hospital Anxiety and Depression Scale anxiety subscale), (*B*) depression (Hospital Anxiety and Depression Scale depression subscale), and (*C*) peritraumatic dissociation (Peritraumatic Dissociation Questionnaire scale) according to the ability of healthcare providers (HCPs) to rest during the pandemic (dark gray indicates no ability at all to rest, medium gray indicates that HCPs could rest from time to time, and light gray indicates that HCPs could often rest). ***$P < 0.0001$ between the group of respondents indicating no ability at all to rest versus the two other groups.

depression (OR, 1.49; 95% CI, 1.09–2.04), whereas witnessing hasty end-of-life decisions was associated with symptoms of depression (OR, 1.69; 95% CI, 1.26–2.27) and dissociation (OR, 1.52; 95% CI, 1.13–2.05).

Discussion

Our cross-sectional survey of 1,058 critical care HCPs in 21 ICUs shows that HCPs had a significant burden of mental health symptoms during the coronavirus pandemic. The following six modifiable factors were independently associated with the presence of symptoms of mental health disorders: fear of being infected, inability to rest, inability to care for one's own family, struggling with difficult emotions, regret about restricted visitation policies, and witnessing hasty end-of-life decisions. Many of these modifiable factors, as well as being a nursing assistant or medical student, were associated with peritraumatic dissociation, which carries a high risk of subsequent post-traumatic stress disorder. These results suggest that psychosocial and workplace measures might improve clinicians' well-being, which might in turn improve the well-being of patients, relatives, and ICU colleagues. Our results indicate that interventions should focus on communication, access to adequate personal protective equipment, adequate rest, and psychological support (3). It is the responsibility of hospitals and ICU leaders to develop strategies to prevent psychological burden. Hospitals should offer information about personal protective equipment availability, training for donning and doffing, and reasons for (and possibilities to circumvent) restricted visitation policies. Hospitals must also offer psychological support to HCPs who struggle with their emotions. ICU directors should organize HCPs' work schedules to ensure that they have time at home and time to rest as well as opportunities for short breaks or naps. Each HCP should strive to maintain effective and ethical decision-making processes, particularly during end-of-life care, keeping the patient at the center of all decisions even when beds and ventilators are scarce (15). Visitation restrictions are necessary to protect family members,

A

B

C
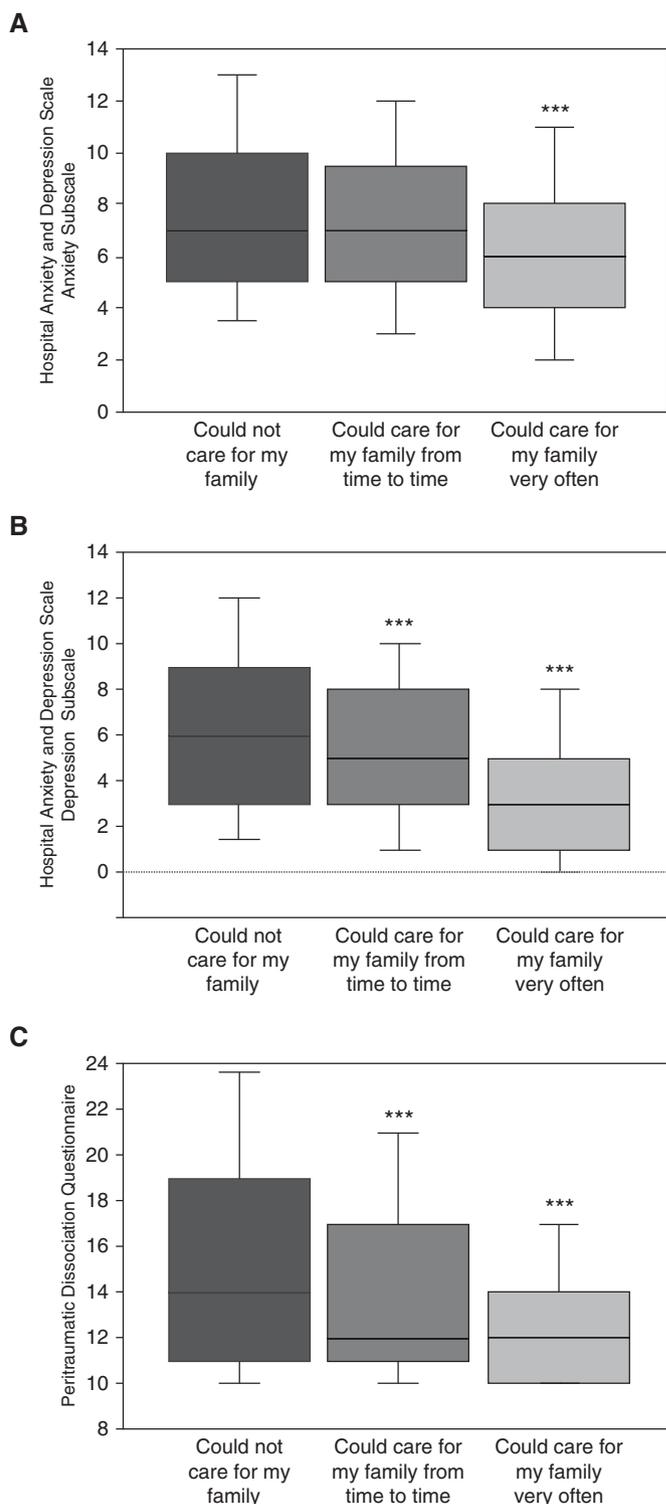
Figure 4. Box plots depicting respondents' (*A*) anxiety (Hospital Anxiety and Depression Scale anxiety subscale), (*B*) depression (Hospital Anxiety and Depression Scale depression subscale), and (*C*) peritraumatic dissociation (Peritraumatic Dissociation Questionnaire scale) according to the ability of healthcare providers (HCPs) to care for their own family during the pandemic (dark gray indicates no ability at all to care for their own family, medium gray indicates that HCPs could care for their own family from time to time, and light gray indicates that HCPs could often care for their own family). ***$P < 0.0001$ between the group of respondents indicating no ability at all to care for their own family versus the two other groups.

clinicians, and the public during the COVID-19 pandemic. Visits by possibly infected relatives expose patients and staff to significant risks of infection (16, 17). On the other hand, family members often fear they might contract the infection during visits. Short visits by a limited number of relatives can be allowed, provided that the relatives are free of symptoms and receive training in preventive measures. Frequent telephone contacts, videoconferences, and other innovative measures can maintain the link with the family and allow effective communication (18).

Another important finding from this study is that greater exposure to patients with COVID-19 was not associated with symptoms of mental health disorders. This indicates that preventive strategies should not be limited to settings with high COVID caseloads but instead should be implemented in all hospitals.

Several studies have assessed psychological symptoms in HCPs managing patients with COVID-19 (4). In a systematic review, among 13 studies assessing the prevalence of depression, anxiety, or insomnia in HCPs during the pandemic, only one focused on ICU staff (5). Moreover, all the studies but one were conducted in China. Interestingly, the pooled prevalence for anxiety and depression was 23%, which was far lower than the rates reported in the present study, suggesting that the critical care setting exposes HCPs to more psychological burden. This is in agreement with a study in which the prevalence of symptoms of anxiety and depression were 44.6% and 50.4%, respectively (5).

An important implication of our findings is that in addition to impairing HCPs' attention and decision-making capacity, these psychological symptoms might later affect overall well-being, generating anger, frustration, and moral distress to the extent that the individual may decide to change professions. Developing preventive strategies may thus support the willingness of HCPs to continue caring for seriously ill patients, thus protecting a resource that becomes scarce at times of healthcare crises (7, 15, 19, 20).

Fear is part of the negative emotions that are present at an early stage in HCPs caring for patients with COVID-19 (21). Fear in turn causes fatigue, discomfort, a feeling of helplessness, and an inability to

Table 3. Factors Associated with the Presence of Symptoms of Anxiety, Depression, or Peritraumatic Dissociation by Multivariable Analysis

	Associations with Symptoms of Anxiety [OR (95% CI)]	Associations with Symptoms of Depression [OR (95% CI)]	Associations with Symptoms of Dissociation [OR (95% CI)]
Sex, M	0.58 (0.42–0.79)	0.57 (0.39–0.82)	0.49 (0.34–0.72)
Role in the ICU			
Nursing assistant	1.46 (1.03–2.09)	1.20 (0.83–1.73)	1.20 (0.82–1.74)
Medical student	1.14 (0.45–2.90)	0.50 (0.13–1.93)	2.98 (1.14–7.82)
University-affiliated hospitals	0.59 (0.43–0.81)	—	0.58 (0.42–0.80)
Fear of being infected	1.21 (1.14–1.28)	1.10 (1.03–1.17)	1.09 (1.02–1.16)
Fear of infecting ICU colleagues	—	2.58 (1.44–4.65)	1.67 (0.92–3.03)
Having seen >30 patients with COVID-19	1.20 (0.88–1.64)	—	—
Number of COVID-19 deaths managed			
None	—	Ref.	—
<2	—	1.34 (0.69–2.58)	—
3–10	—	2.03 (1.12–3.68)	—
>10	—	2.03 (1.03–4.01)	—
Witnessed hasty end-of-life decisions	—	1.69 (1.26–2.27)	1.52 (1.13–2.05)
Regrets restricted visitation policies for the relatives	1.39 (1.03–1.86)	1.49 (1.09–2.04)	
Struggles with emotions	—	—	1.16 (1.06–1.27)
Feels part of a healthcare elite	—	—	1.54 (1.14–2.08)
Could rest during the pandemic			
Not at all	Ref.	Ref.	Ref.
From time to time	0.59 (0.42–0.83)	0.46 (0.33–0.65)	0.58 (0.41–0.82)
Very often	0.29 (0.20–0.44)	0.14 (0.08–0.23)	0.46 (0.29–0.73)
Could care for my family during the pandemic			
Not at all	—	—	Ref.
From time to time	—	—	0.57 (0.39–0.82)
Very often	—	—	0.35 (0.22–0.53)

Definition of abbreviations: CI = confidence interval; COVID-19 = coronavirus disease; OR = odds ratio; Ref. = reference.

use self-coping strategies. Fear and exposure to threatening events can dramatically impair decision-making capabilities (22). In our study, fear of being infected was associated with symptoms of anxiety, depression, and peritraumatic dissociation. Inadequate protection from infection was not reported in the participating ICUs. However, the risk of being infected was obvious, as most HCPs (84.8%) had a colleague who was infected, 40.4% had a relative infected, and 8% had been infected themselves. Moreover, fear fuels exhaustion, frustration, isolation, and withdrawal from families (23), which are major determinants of psychological burden.

An inability to rest was also associated with the highest prevalence of anxiety, depression, and peritraumatic dissociation. Sleep deprivation is a major cause of impaired neurobehavioral performance. Our finding that up to 40% of respondents reported insomnia raises concerns about patient safety. In a randomized study, serious medical errors committed by interns were substantially more common when the interns had frequent shifts of 24 hours or more (24). Similarly, studies have shown that nurse staffing is a major determinant of patient safety and nurse burnout and dissatisfaction (25, 26). For instance, each additional patient per nurse was associated with a 23% increase in the odds of burnout and a 15% increase in the odds of job dissatisfaction (25). Also, studies have suggested that sleep deprivation and long shifts adversely impact nurses' health and job performance (27, 28). Furthermore, mood swings (reflected by the 15% prevalence of euphoria, exaltation, and hyperactivity) might contribute to the inability to rest (29). Hence, a strategy that preserves both sleep quantity and mood stability is warranted (30).

Restricted visitation policies were associated with the presence of symptoms of anxiety and depression in HCPs. The psychological effects of quarantine include post-traumatic stress symptoms, confusion, and anger (31). In these vulnerable families, having a loved one in the ICU adds to this burden. Moreover, because family visits were mostly banned, additional frustration was inflicted on the relatives. Restricting visitation counteracts more than 20 years of research aimed at improving family-centered care (32), thus compelling HCPs to lower the quality of the care they provide, which may induce frustration, emotional exhaustion, and guilt. Along this line, the number of deaths was associated with symptoms of depression, as was witnessing end-of-life decisions taken using suboptimal processes (33).

This study has several limitations. First, it is restricted to France and may not be generalizable to other settings. However, COVID-19 is a global pandemic that puts ICU staff in the front line worldwide (5). Second, this cross-sectional study provides data from a survey. However, the large

number of respondents and 67% response rate ensure the external validity of our findings. Third, this study assesses the prevalence of symptoms of anxiety, depression, and peritraumatic dissociation at one point in time. These symptoms may be transient, and long-term follow-up data are needed. Fourth, semistructured interviews would have been useful because the personal experience of HCPs may be better captured by qualitative research (34). Last, this cross-sectional study does not allow us to demonstrate that COVID-19 was responsible for additional psychological burden in frontline healthcare professionals, as no pre–COVID-19 data are available. Moreover, peritraumatic dissociation, which increases the risk of subsequent post-traumatic stress disorder, has not been measured previously in ICU healthcare providers. However, previous studies by our group found that ICU nurses (35) and ICU physicians (36) had rates of depression of 12% and 24%, respectively. These proportions are far lower than those reported in the present study. Furthermore, in a systematic review and meta-analysis (4), anxiety was assessed in 12 studies, with a pooled prevalence of 23.2%, and depression was assessed in 10 studies, with a prevalence of 22.8%. These data suggest that both the COVID-19 pandemic and the critical care environment are circumstances that generate high psychological risk for healthcare providers.

Conclusions

Critical care HCPs have been facing tremendous psychological burden during the COVID-19 pandemic. Understanding the psychological insult created by a public health crisis, as well as its determinants, may help hospitals, HCPs, and communities to better prepare for such disasters. This point is particularly important because even in countries where the pandemic seems to be somewhat under control, further surges may well occur in the near future. Our study generates strong hypotheses for guiding preventive strategies designed to target the six potentially modifiable determinants of psychological burden in ICU staff. These preventive strategies should be aimed at all ICU HCPs, notably the nurses and nursing assistants, in whom the burden was particularly great. HCPs working in settings where the number of deaths is high are also particularly vulnerable. Studies to evaluate long-term mental outcomes after this first COVID-19 surge are warranted. ∎

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