Impact of the COVID-19 pandemic on the development of burnout syndrome in healthcare providers: prevalence and predictive factors

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Abstract
Background: In Tunisia, the pandemic is still ongoing, resulting in the burnout of healthcare providers.

Aims: This study aimed to assess the impact of the management of COVID-19 patients on the physical and mental health of healthcare providers, and to identify the independent and predictive variables for the three components of severe burnout: emotional exhaustion, depersonalization, and lack of personal accomplishment at work.

Methods: It was a cross-sectional survey. Data were collected between February 8, and April 11, 2021. Healthcare providers, who were positive for COVID, completed the questionnaire. The primary endpoint was to assess the degree of burnout in healthcare providers by adopting the original version of the severe Maslach Burnout Inventory: emotional exhaustion (≥30), depersonalization (≥12), and lack of personal accomplishment at work (≤ 33). A descriptive analysis followed by a bi- and multivariate analysis was performed to identify independent and predictive factors for each component of burnout.

Results: 700 healthcare providers were audited. Emotional exhaustion was ≥ 30 in 86%, depersonalization was ≥ 12 in 61%, and lack of personal accomplishment at work was ≤ 33 in 69%. Of the 700 healthcare providers, 93% were working at the same time in the COVID units, 85% had not received compensatory rest. Healthcare provider who had been infected by COVID-19 was the only independent predictive variable of severe emotional exhaustion and severe depersonalization. Healthcare provider who had been infected by COVID-19 and did not have a compensatory rest were two independent predictive variables of severe lack of personal accomplishment at work.

Conclusion: Healthcare provider who had been infected by COVID-19 was the only predictive variable of severe emotional exhaustion and severe depersonalization. Healthcare provider who had been infected by COVID-19 and did not have a compensatory rest were two independent and predictive variables of severe lack of personal accomplishment at work.

Keywords: Burnout, Infections diseases Nursing, Healthcare provider, Prevalence, Health Risk.

Résumé
Contexte : En Tunisie, la pandémie est toujours en cours, entraînant l’épuisement professionnel des travailleurs de la santé.

Objectifs : Cette étude visait à évaluer l’impact de la prise en charge des patients COVID-19 sur la santé physique et mentale du personnel de santé, et à identifier les variables indépendantes et prédictives des trois composantes du burnout sévère : épuisement émotionnel, dépersonnalisé, et défaut d’accomplissement personnel au travail.

Méthodes : Il s’agissait d’une enquête transversale. Les données ont été recueillies entre le 8 février et le 11 avril 2021. Les travailleurs de la santé qui ont contracté la maladie COVID-19 ont rempli le questionnaire. Le critère principal était d’évaluer le degré d’épuisement professionnel chez les travailleurs de la santé en adoptant la version originale du Maslach Burnout Inventory sévère : épuisement émotionnel (≥30), dépersonnalisation (≥12) et défaut d’accomplissement au travail (≤ 33). Une analyse descriptive suivie d’une analyse bi- et multivariée a été réalisée pour identifier les facteurs indépendants et prédictifs de chaque composante du burnout.

Résultats : 700 travailleurs de la santé ont été audité. L’épuisement émotionnel était ≥ 30 chez 86 %, la dépersonnalisation était ≥ 12 chez 61 % et le défaut d’accomplissement personnel au travail était ≤ 33 chez 69 %. Sur les 700 travailleurs de la santé, 93 % travaillaient au même temps dans les unités COVID, 85 % n’avaient pas bénéficié de repos compensatoire. L’atteinte par la maladie COVID-19 a été la seule variable indépendante et prédictive de l’épuisement émotionnel sévère et de la dépersonnalisation sévère. L’atteinte par la maladie COVID-19 et l’absence de repos compensateur ont constitué deux variables indépendantes et prédictives du défaut sévère d’accomplissement personnel au travail.

Conclusion : L’atteinte par la maladie COVID-19 a été la seule variable indépendante et prédictive de l’épuisement émotionnel sévère et de la dépersonnalisation sévère. L’atteinte par la maladie COVID-19 et l’absence de repos compensateur ont constitué deux variables indépendantes et prédictives du défaut sévère d’accomplissement personnel au travail.

Mots clés : Burnout, Infections maladies Infirmières, Personnel soignant, Prévalence, Risque pour la santé.

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INTRODUCTION

The COVID-19 pandemic has been declared in the world since the end of 2019 and continues until now (1). The novelty of the virus, the peculiarity and sometimes the severity of the clinical presentation make its management by healthcare providers (HCP), a costly challenge both physically and mentally, and is likely to continue beyond the pandemic (1). According to António Guterres, Secretary General of the United Nations, «The COVID-19 virus attacks our physical health and also increases psychological suffering».

The World Health Organization declared the epidemic as an international public health emergency on January 30, 2020, the number of deaths worldwide amounted to 479,496, among 93,434,48 confirmed cases (2). The disease had reached Tunisia on March 2020 (3, 4).

HCP play a critical role in the health systems response to the COVID-19 pandemic as they are the frontline HCP directly involved in the treatment and care of patients. They have been under extreme and persistent psychological pressure as they are particularly exposed to the threat of SARS-COV-2 infection, and they are overwhelmed by fear regarding the safety of their health, close family members, and patients (1). Under these circumstances, HCPs experience serious psychological and mental problems that can lead to burnout (1). Burnout was originally defined as a syndrome of physical and mental exhaustion. Maslach and Jackson (5) described three dimensions: emotional exhaustion (EE) (characterized by being emotionally overworked and exhausted by one’s work), depersonalization (DP) (feelings of cynicism and loss of empathy), and a lack of personal accomplishment at work (PAW) (diminished feelings of competence and achievement in work).

Since the first wave of the COVID-19 pandemic, health care facilities, with exhausted HCP, have been the worst-case scenario for dealing with the pandemic (6). HCP are subject to many stressors. On the one hand, they are subject to the stressors represented by the unpredictability of the situation, the containment measures imposed by the SARS-COV2 epidemic, the rapidity of the intercontinental spread of the infection, the anxiety for the future (7), the high morbidity and mortality (8). The required social distancing can cause social and psychological distress (9). On the other hand, they may be subject to additional stressors that are related to the nature of their profession, such as: Increased workload, long working hours, discomfort from personal protective equipment (9), and inability to provide appropriate health services due to large numbers of patients (7). Additional stressors can lead to burnout and mental exhaustion (9). Burnout syndrome is also associated with anxiety, depression, decreased satisfaction, decreased quality of care and increased suicide rates among HCP (10).

HCP play a key role in controlling of COVID-19 infection (9). Their physical and psychological safety is a crucial and primary element in the management of the pandemic (9). This study aimed: 1) to assess the impact of COVID-19 patient management on the physical and mental health of frontline HCP in Tunisian health care centers (public and private sectors), and 2) to identify independent and predictive variables of severe burnout for the three components: emotional exhaustion (EE), depersonalization (DP) and lack of personal accomplishment at work (PAW).

METHODS

This is a cross-sectional survey, assessing the impact of the COVID-19 pandemic, spanning nine weeks from February 08, 2021, to April 11, 2021, corresponding to a new wave of COVID in Tunisia.

Eligibility criteria

HCPs who managed COVID positive patients were included: Physicians in Anesthesia-Resuscitation (PAR), Residents in Anesthesia-Resuscitation (RAR), Senior Anesthesia Technicians (SAT) and Senior Emergency Technicians (SET). The audited departments belong to Teaching Hospitals (TH), regional hospitals and private clinics

Primary endpoint

The primary endpoint was to assess the degree of burnout in HCPs by adopting the original version of the Maslach Burnout Inventory (MBI) (5).

The MBI consists of 22 questions and explores three dimensions: emotional exhaustion (EE) (9 items), depersonalization (DP) (5 items), and lack of personal accomplishment at work (PAW) (8 items) (11). Each participant must complete the French version of the MBI grid (11).

Collection of variables

In practice, two grids were established, each participant had to complete both grids. The Maslach Burnout Inventory grid (11) allows us to have: 1) the percentage of burnout in the three domains and 2) to classify the degree of severity in each domain. Another grid concerned: 1) the professional identity of the HCP, modalities of his or her access to work, 2) the impact of the COVID-19 pandemic on the psychological state of HCP during and after the care of COVID-positive patients. AJ (one of the authors) travelled to collect the grids. Some forms were filled out at the site and instantly retrieved by AJ, others were filled out and sent in about a week later. Data were entered using SPSS version 25 software.

Data entry and statistical analysis

For qualitative variables, we calculated frequencies and percentages with their 95% confidence intervals. For quantitative variables, we presented the variables by their mean and standard deviation when the distribution was Gaussian, elsewhere the quantitative variables are represented by their median, interquartile and extremes. We compared for each component of burnout, the severe burnout group to the no-severe burnout group: Emotional exhaustion (Emotional exhaustion ≥ to 30 versus Emotional exhaustion < to 30), depersonalization (Depersonalization ≥ to 12 versus Depersonalization < to 12) and a lack of personal accomplishment at work (Personal accomplishment at work ≤ to 33versus Personal accomplishment at work > to 33). For this, we used appropriate statistical tests: chi-square test or Fisher’s exact test for qualitative variables and Student’s t test or Mann-Whitney U test for quantitative variables when appropriate.

Variables, associated with a statistically significant difference (p≤0.05) for each component of severe burnout retained in the bivariate analysis, were introduced into a multivariate analysis (logistic regression) to identify the independent and predictive variables of severe burnout for the three components: Emotional exhaustion (EE), depersonalization (DP), and lack of personal accomplishment at work (PAW). The results of the multivariate analysis were expressed by their OR (Odds Ratio) and their 95% confidence interval. The statistical significance level was set at 0.05.
Ethical Consideration
The agreement of the head department and the participants was systematically taken. The anonymity of the participants was respected. The local ethics committee granted a favorable opinion for this study.

RESULTS
Of 750 HCPs contacted, 700 of them were audited in 2 modes: face-to-face (n=650) and online (n=50). The origin of the HCPs was as follows: Teaching Hospitals: n=575 (82%), Regional Hospitals: n=84 (12%) and private clinics: n=41 (6%).

The questionnaire was distributed to Senior Anesthesia Technicians: n=355 (51%), Residents in Anesthesia Resuscitation: n=288 (41%), Physicians in Anesthesia Resuscitation: n=38 (5%) and Senior Emergency Technicians: n=19 (3%).

Descriptive Analysis
Tables 1 and 2 summarize the descriptive data from the survey. Emotional exhaustion was ≥ 30 in 86% with a [ 95% confidence interval 83.5%-88.5%], depersonalization was ≥ 12 in 61% with a [ 95% confidence interval 57.4%-64.6%], and lack of personal accomplishment at work was ≤ 33 in 69% with a [ 95% confidence interval 65.6%-72.4%]. Our study population had a slight male predominance 56%. The age range of 23 to 33 years was the most represented in 60% of cases. Of the 700 respondents, 93% were working at the same time in the COVID units, 85% had not received compensatory rest and 75% of the staff had COVID disease. The most alarming emotional sensation experienced during the COVID-19 pandemic by all HCPs was depression with suicidal thoughts 86%. In addition, almost all HCPs 95% suffered from a lack of family and social support.

| Emotional exhaustion | Number | Percentage (%) |
|----------------------|--------|----------------|
| Total greater than or equal to 30 | 602 | 86 |
| Total between 18 and 29 | 63 | 9 |
| Total less than or equal to 17 | 35 | 5 |

| Depersonalization | Number | Percentage (%) |
|-------------------|--------|----------------|
| Total greater than or equal to 12 | 426 | 61 |
| Total between 6 and 11 | 220 | 31 |
| Total less than or equal to 5 | 54 | 8 |

| Lack of personal accomplishment at work | Number | Percentage (%) |
|----------------------------------------|--------|----------------|
| Total less than or equal to 33 | 480 | 69 |
| Total between 34 and 39 | 175 | 25 |
| Total greater than or equal to 40 | 45 | 6 |

Table 1. Maslach Burnout Inventory score

| Number | Percentage % |
|--------|--------------|
| Male   | 392          | 56 |
| Female | 308          | 44 |
| Age    |              |    |
| [23-33 years] | 422 | 60 |
| [34-43 years] | 202 | 29 |
| > 43 years | 76 | 11 |
| Marital status |          |    |
| Single | 396          | 57 |
| Married | 267          | 38 |
| Divorced | 37          | 5  |
| Do you have children? |       |    |
| Yes    | 274          | 39 |
| No     | 426          | 61 |
| Transport to work |           |    |
| Private | 440          | 63 |
| Public  | 252          | 36 |
| By foot | 8            | 1  |
| Work site |             |    |
| Teaching Hospitals | 575 | 82 |
| Regional Hospitals | 84  | 12 |
| Private Clinics | 41  | 6  |
| Original department |          |    |
| Operating room | 419 | 60 |
| Intensive care unit | 229 | 33 |
| Emergency | 52  | 7  |
| Work unit during Covid:* COVID Unit | Yes | 652 | 93 |
| Work/Rest schedule |                      |    |
| One week of work /one week of rest | Yes | 106 | 15 |
| No compensatory rest | Yes | 585 | 85 |
| Have you experienced any changes in your schedule? | Yes | 667 | 95 |
| No | 33  | 5  |
| Risk factors at the beginning of COVID patient management |            |    |
| Impossibility of ensuring an adequate care due to lack of training | Yes | 358 | 51 |
| No | 342 | 49 |
| A Disruption of family and social life | Yes | 620 | 89 |
| No | 80  | 11 |
| Fear of contagion and loss of family members or colleagues | Yes | 615 | 88 |
| No | 85  | 12 |
| Loneliness and the spread of social isolation | Yes | 480 | 69 |
| No | 220 | 31 |

* 93% were working at the same time in the COVID units.
Identification of risk factors

Independent and predictive variables of emotional exhaustion

The bivariate analysis showed that men had an extremely elevated level of severe emotional exhaustion compared to women 65.1% of cases. The age group 23-33 years and single people were the most exposed to emotional exhaustion among HCPs. Emotional exhaustion was the most severe among all the staff audited from the teaching hospital with a percentage of 95.5%. Most of the HCPs, 94.5%, were working at the same time in the COVID unit. No compensatory rest, concerning 82.4% of HCPs, led to a severe increase in emotional exhaustion.

Other factors increased the emotional exhaustion of the HCPs, such as: disruption of family and social life in 91.4%. SARS COV2 in HCPs led to a severe increase in emotional exhaustion with a percentage of 71.9%.

The multivariate analysis (Table 3) allowed us to conclude that HCPs who had COVID disease had a 3.8 times greater risk of severe emotional exhaustion than HCPs who did not have COVID disease. The probability of having severe emotional exhaustion for HCPs who have had COVID is 17%.

Independent and predictive variables for depersonalization

For severe depersonalization, after performing the bivariate analysis, the multivariate analysis (Table 3) allowed us to conclude that a HCP, who had COVID disease, has a 27.6 times higher risk of having severe depersonalization compared to HCPs who did not have COVID disease. The probability of having severe depersonalization for HCPs who have had COVID is 77.7%.

Independent and predictive variables of the lack of

Table 2. The impact of the COVID-19 pandemic on the mental and physical health of healthcare providers: Descriptive analysis (continued 2/2).

| Variables                                              | Number | Percentage % |
|--------------------------------------------------------|--------|--------------|
| • Behavior change                                      | Yes    | 356          |
| • Lack of support                                      | Yes    | 666          |
| • Dressing/undressing problem (feeling of discomfort)  | Yes    | 300          |
| • Lack of material resources                           | Yes    | 85           |
| • Management of upper airway problems                  | Yes    | 204          |
| • Behavior change                                      | No     | 344          |
| • Lack of support                                      | No     | 666          |
| • Dressing/undressing problem (feeling of discomfort)  | No     | 34           |
| • Lack of material resources                           | No     | 400          |
| • Management of upper airway problems                  | No     | 307          |
| Have you experienced any difficulties in managing COVID Patient? | Yes    | 393          |
| • Behavior change                                      | No     | 215          |
| • Lack of support                                      | No     | 85           |
| • Dressing/undressing problem (feeling of discomfort)  | No     | 204          |
| • Lack of material resources                           | No     | 496          |
| • Management of upper airway problems                  | No     | 552          |
| Have you infected by COVID?                            | Yes    | 178          |
| • Behavior change                                      | No     | 671          |
| • Lack of support                                      | No     | 29           |
| • Dressing/undressing problem (feeling of discomfort)  | No     | 676          |
| • Lack of material resources                           | No     | 75           |
| Did you go into confinement after working in the COVID unit? | No     | 24           |
| Confinement zone :                                     |        |              |
| • Behavior change                                      | At home| 418          |
| • Lack of support                                      | In a hotel| 178        |
| • Dressing/undressing problem (feeling of discomfort)  | At the Hospital | 56    |
| • Lack of material resources                           | Normal Resumption | 219  |
| Healthcare providers’ back-to-work after confinement : |        |              |
| What emotions did you express during COVID-19 pandemic? | Yes    | 658          |
| • Fear, constant worry about the future                | Yes    | 616          |
| • Feeling sad, frustrated, tired and loss of interest  | Yes    | 511          |
| • Feeling lonely, socially excluded, and rejected by others | Yes    | 459          |
| • Confusion with inability to feel oneself lack of awareness of reality | Yes    | 688          |
| • Lack of family and social support                    | Yes    | 629          |
| • Sleep disorder.                                      | Yes    | 291          |
| • Eating disorders                                     | Yes    | 605          |
| • Depression/Suicidal thoughts                         | Yes    | 70           |
| • Addiction: alcoholic caregivers.                     | Yes    | 367          |
| • Acute and/or post-traumatic stress                   | Yes    | 57           |
| • Lack of support                                      | No     | 434          |
| • Dressing/undressing problem (feeling of discomfort)  | No     | 666          |
| • Lack of material resources                           | No     | 56           |
| • Management of upper airway problems                  | No     | 10           |
| Health-related behaviors’ back-to-work after confinement : | No     | 367          |
| What emotions did you express during COVID-19 pandemic? | Yes    | 658          |
| • Fear, constant worry about the future                | Yes    | 616          |
| • Feeling sad, frustrated, tired and loss of interest  | Yes    | 511          |
| • Feeling lonely, socially excluded, and rejected by others | Yes    | 459          |
| • Confusion with inability to feel oneself lack of awareness of reality | Yes    | 688          |
| • Lack of family and social support                    | Yes    | 629          |
| • Sleep disorder.                                      | Yes    | 291          |
| • Eating disorders                                     | Yes    | 605          |
| • Depression/Suicidal thoughts                         | Yes    | 70           |
| • Addiction: alcoholic caregivers.                     | Yes    | 367          |
| • Acute and/or post-traumatic stress                   | Yes    | 57           |

Table 3. Independent predictive variables of different components of severe Burnout: (Logistic regression)

| Variables                         | Severe emotional exhaustion | Severe depersonalization | Severe lack of personal Accomplishment at work |
|-----------------------------------|-----------------------------|--------------------------|-----------------------------------------------|
| OR 95%CI p                        | OR 95%CI p                  | OR 95%CI p               |                                               |
| Were you affected by Covid? (Yes) | 3.860 [1.901-7.837] <10^-4 | 27.650 [16.602-45.994] 10^-4 | 0.056 [0.008-0.406] 0.004                     |
| Did you have compensatory rest? (No) | 500 [76.92-10000] <10^-4 |                                        |                                               |

OR: Odds Ratio 95%CI: Confidence Interval of 95% p: Probability of the null hypothesis
personal accomplishment at work

Concerning the severe lack of personal accomplishment at work and after performing the bivariate analysis, the multivariate analysis (Table 3) allowed us to conclude that a HCP who had COVID disease and who works in a COVID unit without compensatory rest has a 33-fold increase in risk, with a 95% confidence interval 30.35%-36.05%, of having a severe lack of personal accomplishment at work compared to a HCP who did not have COVID disease and who works in a COVID unit benefiting of compensatory rest. HCP who had COVID disease and who works in a COVID unit without compensatory rest has an 80% risk of developing a severe lack of personal accomplishment at work. On the other hand, HCP who has not had COVID disease and who works in a COVID unit without compensatory rest has a 98.4% risk of developing a severe lack of personal accomplishment at work.

DISCUSSION

Our study showed that the prevalence of severe burnout was 86% for emotional exhaustion ≥ to 30, 61% for depersonalization ≥ to 12, and 69% for lack of personal accomplishment at work ≤ to 33. HCP who had been infected by COVID-19, was the only independent and predictive variable for severe emotional exhaustion and severe depersonalization. HCP who had been infected by COVID-19 and had no compensatory rest were two independent and predictive variables of severe lack of personal accomplishment at work. This study was focused on assessing the impact of the COVID-19 pandemic on the mental and physical health of frontline HCP in public and private Tunisian health facilities.

In the literature, the prevalence of severe burnout is variable. Two authors (12,13) found a high prevalence. Faria et al (12) reported in 2021 a high prevalence for frontline HCP with severe emotional exhaustion (EE) of 50%, severe depersonalization (DP) of 37.8% and severe lack of personal accomplishment at work (PAW) 64.6%. Houdmont et al (13), reported on a cross-sectional online survey of 142 surgeons with COVID-19. They found a high prevalence for all three domains: emotional exhaustion (EE) of 57%, depersonalization (DP) of 50% and lack of personal accomplishment at work (PAW) of 15%. Lorello et al (14), showed that burnout in male anesthesiologists manifested with a significantly higher level of depersonalization compared to women. Gahramani et al (15) reported a systematic review (SR) mentioning a lower prevalence than ours: EE 51%, 95%CI [42%-61%], DP 52%, 95%CI [39%-65%] and lack of PAW 28%, 95%CI [25%-31%]. In contrast, Galanis (6), reported a lower prevalence: EE 34.1%, DP 12.6% and lack of PAW 15.2%. A systematic review (16) reported that in the first line HCP in Italy, the percentages of emotional exhaustion (EE) varied between 32% and 36% and for depersonalization (DP) they varied between 12% and 14%. Couper et al (17) reported other prevalence rates: EE 26.4%, 95%CI [25.8%-27.0%], DP 5.5%, 95%CI [5.2%-5.7%] and lack of PAW 34.6%, 95%CI [34.2%-35.0%].

As concerns symptomatology, a systematic review (2), including 69 499 subjects, revealed a prevalence of depression from 13.5% to 44.7%, anxiety from 12.3% to 35.6%, post-traumatic stress reaction from 7.4% to 37.4%, insomnia between 33.8% and 36.1% and burnout between 3.1% and 43%. Busch (18), reported 86 studies, collecting data from 75 991 participants with some similarity. Indeed, this similarity concerned anxiety (25.36%, 95%CI [17.90%-33.64%]), depression (25.72%, 95%CI [18.34%-33.86%]), post-traumatic stress (24.51%, 95%CI [18.16%-31.46%]) and burnout (31.81%, 95%CI [13.32%-53.89%]). In addition, Busch (18) reported other symptoms such as: fear about transmission of COVID to family (60.39%, 95%CI [42.53%-76.96%]), perceived stress (56.77%, 95%CI [34.21%-77.95%]), worries about one’s health (45.97%, 95%CI [31.08%-61.23%]), sleep disorders (39.88%, 95%CI [27.70%-52.72%]), mental health problems (23.11%, 95%CI [15.98%-31.10%]), and somatization symptoms (14.68%, 95%CI [10.67%-19.18%]). He concluded that the impact of the COVID-19 pandemic on the mental health of HCP was significant (18). Fernando (19) further showed that physicians are at high risk of suicide with an overall standardized mortality rate of 1.44 95%CI [1.16%-1.72%]. Other authors have also concluded on the effect on the mental health of HCP (20–22).

The long-term follow-up and the appearance of successive waves revealed the accentuation of acute stress and psychological distress (23).

As concerns age and gender factors, our study showed that severe burnout, with its three components, was more frequent in men and HCPs who worked in a teaching hospital. Single people aged 23-33 years among HCPs had a high emotional exhaustion. In contrast, married HCPs aged 34-43 years had severe increase in depersonalization and severe lack of personal accomplishment at work.

In Italy, Gambero (24), found a female predominance of 64.8% among 653 HCP who responded to the questionnaires among 2422. In the USA, Dale (25) found a female predominance of 81.9% among 265 HCP. In UK, Couper et al reported that among midwives the most affected age group was between 51 and 60 years (17).

The Meta-Analysis, reported by Serrano-Ripoll et al (26), showed that young people and women were more exposed to burnout. Another Meta-Analysis involving 60 458 HCP had a mean age of 36.1 ± 7.1. 77.1% of them were women (27). Thatrimontrichai et al (28), showed that the risk factors for mental health disorders among HCP during the COVID-19 pandemic were: Women, frontline HCP, younger, older, nurses, divorced, those who were in direct contact with infected patients, those who worked fewer years, those who had an extension of working hours and when there was a lack of personal protective equipment.
Psychological resilience, and family or committed relationship were identified as protective factors (28).

As concerns the workload and compensatory rest factors, the pandemic increased the workload by changing the schedules of the HCP with an increase in the number of hours. Indeed, in our population, 93% of the HCP were working at the same time in the COVID units, which led to severe burnout in its three components: 94.5% for severe emotional exhaustion, 100% for severe depersonalization and 100% for severe lack of personal accomplishment at work. Exhaustion due to a heavy workload was explained by no compensatory rest: 82.4% for severe emotional exhaustion, 100% for severe depersonalization and 97.7% for severe lack of personal accomplishment at work.

A systematic review (16) reported that frontline HCP living in areas with a higher incidence of the disease had less rest (5.6 h/day versus 6.2 h/day for other professionals), with more exhaustion. In addition, this RS (16) showed that psychological stress varied in intensity, ranging from mild and moderate to severe and extremely severe. Fernandez (29) showed that during the pandemic one of the main factors that influenced nurses’ ability to cope with workload was staff shortages.

Turner’s systematic review (30) mentioned that the use of personal protective equipment mitigated burnout, however it made working conditions difficult when working for several hours. In the words of one respondent (30), “Wearing a mask and gloves and using a face shield for several hours is very difficult because it cannot be tolerated for one hour, but you have to put up with it for six hours and you can’t even meet your needs” (30). Another systematic review (31), reported that HCP were suffering from both physical and mental fatigue due to increased work hours, so they do not have enough time to sleep, rest and recover.

HCP reported hyperexcitation (32). Couper et al mentioned that 37.8% 95%CI [36.3%-39.4%] of HCP reported their intention to leave their care position because of workload (17).

The HCP history of COVID-19 disease played an important role. Indeed, our study showed that SARS COV2 (COVID-19) was a risk factor for all three components of severe burnout: 71.9% for EE, 95.3% for DP and 84.6% for lack of PAW.

A systematic review with Meta-Analysis (27), collected 115 articles in frontline HCP. The authors found that 75.5% of HCP were infected with SARS COV2 (COVID-19) (27). In contrast, Houdmont (13), showed that the prevalence of burnout was not related to COVID-19 status.

Other predictive factors of burnout, found by the bivariate analysis of our series and not identified by the multivariate analysis, have been cited in the literature (33) such as: lack of family support and social distancing.

António Guterres recalled that “2020 was a year of death, disaster and despair”, but crises promote change. “The year 2022 could be the year of opportunity and hope”. As a recommendation, according to the data of our study, HCP who had been infected by COVID-19 was certainly responsible for burnout with its three components, but attention should be paid to the fact that every HCP should have a compensatory rest.

In the literature, other recommendations have been mentioned such as: 1) establishing a better infrastructure and organization to face this pandemic situation, which is the role of decision makers and professional organizations (reorganization of work, support of the morale of health professionals) (34–36), 2) creation of guidelines for the preventive and curative aspect (37–39). Mira (39) said that lessons should be learned from the first and second waves to have appropriate guidelines for the future. 3) Leo (40) stated that the main recommendation to address the challenge is cultural change and health systems improvement through long-term research and planning.

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E. Zaffina S. SARS/MERS/SARS-CoV-2 Outbreaks and Burnout Syndrome among Healthcare Workers. An Umbrella Systematic Review. Int J Environ Res Public Health. 20 2021;18(8):4361.

11. Maslach C, Jackson SE, Michael P. Leiter, Willmar B. Schaufeli, Richard L. Schwab. Maslach Burnout Inventory. Place of publication not identified: Mind Garden; 1986.

12. Faria ARQ de P, Coelho HFC, Silva AB, Darnascena LCL, Caneiro RR, Lopes MT, et al. Impact of the COVID-19 pandemic on the development of burnout syndrome in frontline physicians: prevalence and associated factors. Rev Assoc Med Bras (1992). juil 2021;67(7):942-9.

13. Houdmont J, Dallya P, Theophiliou E, Adiamah A, Hassard J, Lobo DN. Burnout Among Surgeons in the UK During the COVID-19 Pandemic: A Cohort Study. World J Surg. 2022;46(1):1-9.

14. Lorello GR, Gautam M, Barden C, Peer M. Impact of the intersection of anaesthesia and gender on burnout and mental health, illustrated by the COVID-19 pandemic. Anaesthesia. avr 2021;76 Suppl 4:24-31.

15. Ghahramani S, Lankarani KB, Yousefi M, Heydari K, Shahabi S, Azmand S. A Systematic Review and Meta-Analysis of Burnout Among Healthcare Workers During COVID-19. Front Psychiatry. 2021;12:758849.

16. Danet Danet A. Psychological impact of COVID-19 pandemic in Western frontline healthcare professionals. A systematic review. Med Clin (Basc). 7 mai 2021;156(9):449-58.

17. Couper K, Murrells T, Sanders J, Anderson JE, Blake H, Kelly D, et al. The impact of COVID-19 on the wellbeing of the UK nursing and midwifery workforce during the first pandemic wave: A longitudinal survey study. Int J Nurs Stud. 15 déc 2021;127:104155.

18. Busch IM, Moretti F, Mazzi M, Wu AW, Rimondini M. What We Have Learned from Two Decades of Epidemics and Pandemics: A Systematic Review and Meta-Analysis of the Psychological Burden of Frontline Healthcare Workers. Psychother Psychosom. 2021;90(3):178-90.

19. Fernando B, Reynolds T, Izzy M, Kirchner VA, Wren B, Spiro M. Mental Health Support in the Transplantation Workforce: What Can We Learn From the COVID-19 Pandemic? Exp Clin Transplant. août 2021;19(8):763-70.

20. Camacho KG, Gomes Junior SCDS, Reis AT, Juncqueira-Marinho M de F, França LCM, Abramov DM, et al. Repercussions of the COVID-19 pandemic on health professionals in the state of Rio de Janeiro / Brazil. PLoS One. 2022;17(1):e0261814.

21. Cheristanidis S, Kavadas D, Moustaklis D, Kyriakidou E, Batzou D, Sidiropoulos E, et al. Psychological Distress in Primary Healthcare Workers during the COVID-19 Pandemic in Greece. Acta Med Acad. août 2021;50(2):252-63.

22. Mensinger JL, Brom H, Havens DS, Costello A, D’Annunzio C, Durning JD, et al. Psychological responses of hospital-based nurses working during the COVID-19 pandemic in the United States: A cross-sectional study. Appl Nurs Res. févr 2022;63:151517.

23. Tauro E, Gorini A, Caglio C, Gabanelli P, Caiani EG. COVID-19 and mental disorders in healthcare Personnel: A novel framework to develop Personas from an online survey. J Biomed Inform. 11 janv 2022;126:103993.

24. Gambaro E, Gramaglia C, Marangon D, Azzolina D, Probo M, Rudoni M, et al. The Mediating Role of Gender, Age, COVID-19 Symptoms and Changing of Mansion on the Mental Health of Healthcare Workers Operating in Italy during the First Wave of the COVID-19 Pandemic. Int J Environ Res Public Health. 11 déc 2021;18(24):13083.

25. Dale LP, Cuffe SP, Sambuco N, Guastello AD, Leon KG, Nunez LV, et al. Morally Distressing Experiences, Moral Injury, and Burnout in Florida Healthcare Providers during the COVID-19 Pandemic. Int J Environ Res Public Health. 24 nov 2021;18(23):12319.

26. Serrano-Ripoll MJ, Meneses-Echavez JF, Ricci-Cabello I, Fraile-Navarro D, Fiol-deRoque MA, Pastor-Moreno G, et al. Impact of viral epidemic outbreaks on mental health of healthcare workers: a rapid systematic review and meta-analysis. J Affect Disord. 1 déc 2020;277:347-57.

27. Salazar de Pablo G, Vaquerizo-Serrano J, Catalan A, Arango C, Moreno C, Ferre F, et al. Impact of coronavirus syndromes on physical and mental health of health care workers: Systematic review and meta-analysis. J Affect Disord. 1 oct 2020;275:48-57.

28. Thaithimontrichai A, Weber DJ,Apisamthanarak A. Mental health among healthcare personnel during COVID-19 in Asia: A systematic review. J Formos Med Assoc. juin 2021;120(6):1296-304.

29. Fernandez R, Lord H, Halcomb E, Moxham L, Middleton R, Alananzeh I, et al. Implications for COVID-19: A systematic review of nurses’ experiences of working in acute care hospital settings during a respiratory pandemic. International Journal of Nursing Studies. 1 nov 2020;111:103637.

30. Turner S, Botero-Tovar N, Herrera MA, Borda Kuhlmann JP, Ortiz F, Ramirez JC, et al. Systematic review of experiences and perceptions of key actors and organisations at multiple levels within health systems internationally in responding to COVID-19. Implement Sci. 7 mai 2021;16(1):50.

31. Chigwedere OC, Sadath A, Kabir Z, Arensman E. The Impact of Epidemics and Pandemics on the Mental Health of Healthcare Workers: A Systematic Review. Int J Environ Res Public Health. 22 juin 2021;18(13):6695.

32. 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. nov 2018;87:123-7.

33. Waring S, Giles S. Rapid Evidence Assessment of Mental Health Outcomes of Pandemics for Health Care Workers: Implications for the Covid-19 Pandemic. Front Public Health. 2021;9:629236.

34. Nelson KE, Hanson GC, Boyce D, Ley CD, Swavely D, Reina M, et al. Organizational Impact on Healthcare Workers’ Moral Injury During COVID-19: A Mixed-Methods Analysis. J Nurs Adm. 1 janv 2022;52(1):57-66.

35. Reitz KM, Terhorst L, Smith CN, Campwala IK, Owoc MS, Downs-Canner SM, et al. Healthcare providers’ perceived support from their organization is associated with lower burnout and anxiety within the COVID-19 pandemic. PLoS One. 2021;16(11):e0259858.

36. Secosan I, Virga D, Crainiceanu ZP, Bratu LM, Bratu T. The Moderating Role of Personal Resources Between Demands and Ill-Being of Romanian Healthcare Professionals in the COVID-19 Pandemic. Front Public Health. 2021;9:736099.

37. Jee SF, Jantim A, Mohamed AF, Emiral ME. COVID-19 pandemic: determinants of workplace preventive practice among primary healthcare workers in Sabah, Malaysia. J Prev Med Hyg. sept 2021;62(3):E605-12.

38. Mohammadi F, Tehranineshat B, Bijani M, Oshvandi K, Alananzeh I, et al. Implications for COVID-19: A systematic review and meta-analysis. J Affect Disord. 1 déc 2021;2(1):434.

39. Mira JJ, Cobos-Vargas A, Astier-Peña MP, Pérez-Pérez P, Carrillo I, Guillabert M, et al. Addressing Acute Stress among Professionals Caring for COVID-19 Patients: Lessons Learned during the First Outbreak in Spain (March-April 2020). Int J Environ Res Public Health. 16 nov 2021;18(22):12010.

40. Leo CG, Sabina S, Tumolo MR, Bodini A, Ponzini G, Sabato E, et al. Burnout Among Healthcare Workers in the COVID 19 Era: A Review of the Existing Literature. Front Public Health. 2021;9:750529.