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Health Impact and Psychosocial Perceptions among French Medical Residents during the SARS-CoV-2 Outbreak: A Cross-Sectional Survey

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Abstract: This study compared the impact on mental health and the psychosocial perceptions of medical residents and healthcare workers (HCWs) in a hospital after the first peak of the SARS-CoV2 outbreak in France. A validated version of the SATIN questionnaire with a modified scoring system was used to collect data on health and psychosocial factors. This questionnaire was sent to all workers at the hospital in July 2020 and was self-administered online. Using a multivariate multinomial regression model, the study included demographic variables such as age, gender, years at workplace and the relevant of covariate as HCW status. One thousand, four hundred and six questionnaires were available for analysis including 393 non-HCWs, 891 HCWs and 122 medical residents. Medical resident status is a risk factor for stress (OR 4.77 [2.48–9.18] $p < 0.001$), worse global health (OR 4 [1.7–9.6] $p < 0.001$) and mental health (OR 2.58 [1.3–5.1] $p = 0.02$), negative perception of work demand (OR 8.25 [3.5–19.6] $p < 0.001$), work activity environment (OR 3.18 [1.5–6.7] $p = 0.02$) and organizational context (OR 4.9 [2.38–10.4] $p < 0.001$). Action on collective support, protection equipment, organizational context and framework are important.

Keywords: COVID-19 pandemic; physician; mental health; resident

1. Introduction

In 2020, the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pandemic had an important strengthening effect on healthcare systems, including their healthcare workers (HCWs). The World Health Organization (WHO) emphasized the high burden on healthcare workers and called for action to prevent the impact on their physical and mental health and to improve mental health and psychological well-being (WHO 2020 <https://www.who.int/news/item/17-09-2020-keep-health-workers-safe-to-keep-patients-safe-who> (accessed on 27 July 2021)).

During the SARS-CoV-2 pandemic, a large number of studies have been published on its impact on the mental health of HCWs [1–4]. In a recent systematic review, Muller et al. identified 189 studies and focused on 59 of them [2]. The authors concluded that HCWs reported more anxiety, depression, and sleep problems than the general population, a finding echoed by other reviews in this field [3,4]. Female gender, direct contact with COVID-19 patients and the lack of personal protective equipment (PPE) were significant risk factors for higher prevalence of mental health problems in HCWs [1–6]. In a report of a Spanish association published in May 2020, 86.8% of physicians considered that they could have been a vector of the disease because they lacked adequate protective material [7]. In

an observational study in young surgeons in France, authors found that female gender and increased consumption of alcohol or tobacco were risk factors for anxiety, depression and insomnia. On the other hand, training and having protective equipment significantly decreased the risk [8].

Few studies provide data on physical symptoms and/or psychosocial factors, such as organization, work activity and activity management, in this period for HCWs. In a narrative review of studies conducted in Singapore compared with Chinese data, Ng et al., found a lower prevalence of psychological symptoms but a higher prevalence of physical symptoms, which they concluded were due to somatization [5].

The majority of the participants in these studies were HCWs, including physicians and nurses [9–11]. During this period, all HCWs were exposed to mental health burden factors, such as uncertainty, workload, activity management, and organizational context modifications. The analysis of previous major incidents called not only for specific programs for use during crises but also those to prevent long-term damage to HCWs [12].

In France, the impact of the SARS-CoV-2 pandemic on the healthcare system began in February 2020, with a peak of hospitalizations in March 2020. A decrease in COVID-19 patients hospitalized took place through the spring; and restrictions on movements of the population were lifted on 7 May 2020. The study and questionnaire were administered in July and August 2020. At this time, as in other European countries including Italy, France was seeing a decrease of COVID-19 patients in hospitals and a decrease of deaths among patients which also impacted on the HCWs [13]. One of the challenges of this period for HCWs was to return to regular activities after a period of fear. Laypeople would applaud HCWs every day at 8 pm; this became a tradition. At this time, after the first wave of the pandemic, ethical and judicial questions emerged [14]. Indeed, as demonstrated in a recent comparison of medical claims in Italy between 2019 and 2020, which showed a significant increase in cases related to the time of treatment and/or arrival at hospital, the SARS-CoV-2 pandemic could also have an impact on the professional activities of physicians.

SATIN is a transversal questionnaire developed for preventive medicine which targets well-being at work. It was developed by the National Institute of Research on Security (INRS) in France. It assesses physical and psychological health, work environment and psychosocial factors. It was built based on theoretical models of occupational stress and has been validated through recent studies [15,16].

The aim of this study is to assess the overall health (mental and physical) and psychosocial factors in a population of medical residents in a French teaching hospital during the first peak of SARS-CoV-2 outbreak in France.

2. Materials and Methods

This study is a cross-sectional questionnaire-based study. It was approved by the ethics committee of the Brest Hospital N° B2021CE19. The survey was anonymous, and confidentiality of information was assured.

The research invited all professionals of the hospital to respond to an electronic questionnaire. Sphinx IQ2 software version 3 (Le Sphinx, Paris, France) was used to build the questionnaire and the electronic link. The questionnaire was sent to every hospital worker by email through their professional addresses. Answers were all self-reported. A contact (phone and email) for information and questions about the study was also sent to all the workers. Two other emails were sent to the workers at the middle and two weeks before the end of the inclusion period.

2.1. Participants

The survey was conducted between 1 July 2020 and 31 August 2020 and involved all workers employed in a teaching hospital in France. The total number of workers was 7299 including 799 medical residents.

No anticipated sample size calculation was done. As the study examined prevalence rates, it included all qualified workers.

The inclusion criteria were as follows: working in the hospital for more than one year, adults over than 18 years, and willingness to join the study.

2.2. Questionnaire

The SATIN questionnaire was developed by University of Lorraine and the INRS. A third edition was used. It was piloted in studies with different sample sizes and worker populations. The internal and external validity and comprehension were also tested and validated in a French population of workers [17]. After the authors of the SATIN questionnaire allowed its use, the study team created a more appropriate and specific questionnaire, retaining all original questions and adding some questions on workplaces and demographic data. Participants had to check that they meet the inclusion criteria and agree to be included in this survey. An open question was available at the end for their comments.

There were 86 questions separated into 6 parts: 1. Personal and professional identification (10 questions), 2. Health reports (16 questions), 3. Work strain and capacities (8 questions), 4. Work environment (39 questions), 5. Work assessment (4 questions), 6. Supplementary questions for occupational physicians (9 questions).

Each question had five possible answers and each answer was linked to a specific score. Means of scores were calculated in each part of the questionnaire: health reports (physical health (self-evaluation of health and compared to next year), mental health (self-evaluation of mental health, confidence in the future), physical symptoms (musculoskeletal disorders), psychosomatic symptoms (headache, sleep problems, gastrointestinal problems), and stress (feeling stressed, exhausted at work, crack-up because of job)), work strain and ability (physical, emotional, concentration, knowledge), working environment (physical environment, activity, framework of activities and organizational context), and self-assessment of work conditions in their entirety. The scores of each part were interpreted as follows: <2.5 poor health or negative perception, 2.5–3.5 mild health or perception, >3.5 good health or positive perception. Global health and general workplace environment self-evaluation were scored twice at different times, together with health reports and working environment scores.

Demographic data were self-reported by the participants which included occupation, gender (male/female), age (<34, 35–44, 45–54, >55 years), years spent at the workplace (<5, 6–15, 16–26, >26 years).

2.3. Statistical Analyses

Data analysis was performed using R-4.0.2 and R studio software (R Foundation for Statistical Computing, Vienna, Austria). The results for continuous variables were shown as medians with interquartile ranges (IQRs). The ranked data, which were ranked from each part of the questionnaire, are presented as numbers and percentages. Participants were divided into three groups according to the previously reported questionnaire cut-off (<2.5; 2.5–3.5; >3.5). In France, after six years as a medical student, one becomes a resident for at least 4 years and works at a hospital during this period. During residency, one works full-time in a hospital. Medical residents were included in the subgroup “medical resident”; doctor, nurse, medical student, nurse assistant, midwife, paramedics, physiotherapist and radiographer were included in the subgroup “healthcare worker” (HCW), while other participants were included in the subgroup “non-healthcare worker” (non-HCW). A multinomial logistic regression analysis was performed and the associations between risk factors and outcomes are presented as odds ratio (ORs) and 95% confidence intervals (CIs), after adjustment for confounders including gender, age, years at workplace. The significant level was set at $p = 0.05$.

3. Results

3.1. Demographic Data

The survey was completed by 1407 workers. Of these, 1406 were considered for analysis including 393 (27.95%) non-HCW, 891 (63.3%) HCWs including 122 (8.67%) medical residents. Most participants were women (1113; 79.2%). There were 426 (30.2%) participants aged 35 to 44 years. There were 516 (36.7%) with 6 to 15 years experience in the hospital of study. Demographic data are shown in Table 1.

Table 1. Demographic and occupational characteristics of study population.

		Number	%
Occupation	Nurse	371	26.4
	Nursing Assistant	189	13.4
	Administrative Assistant	141	10
	Doctor	141	10
	Medical Resident	122	8.7
	Health Supervisor	82	5.8
	Radiographer	63	4.5
	Laboratory Technician	43	3.1
	Health Manager	28	2
	Technician	25	1.8
	Physiotherapist	23	1.6
	Midwife	16	1.1
	Others	155	11
	Age in years	<25	39
25–34		396	28.2
35–44		426	30.3
45–54		370	26.3
>55		174	12.4
Night work	Never	725	51.6
	Rarely	342	24.3
	Regularly	92	6.5
	Often/very often	81	5.8
Shift work	Never	420	28.1
	Rarely	313	20.9
	Regularly	329	22
	Often/very often	435	29.1
Years at workplace	<1	334	23.8
	16–25	319	22.7
	26	144	10.2
	6–15	516	36.7
	1–5	257	18.3
Work Status	Non-healthcare	474	33.7
	Healthcare	931	66.3
Frontline worker	Yes	173	12.3
	No	1232	87.7
Gender	Female	1113	79.2
	Male	292	20.8

3.2. Univariate Analysis

In the univariate analysis (Table 2), Medical residents reported less physical symptoms (OR 0.3 [0.2–0.6] $p = 0.0001$) but more stress (OR 2.16 [1.24–3.75] $p = 0.06$), negative perception of work demand (OR 6.1 [2.9–12.7] <0.001), work activity demand (OR 2.2 [1.18–4.16] $p = 0.01$) and organizational context (OR 2.5 [1.36–4.7] $p = 0.003$).

Table 2. Univariate analysis. Associations between risk factors and outcomes are presented as odds ratio and 95% confidence intervals.

Outcome	Medical Residents			Other HCWs		
	<i>n</i>	OR	<i>p</i>	<i>n</i>	OR	<i>p</i>
Physical health	<3.5 67 <2.5 22	1.4 [0.8–2.3]	0.2	>3.5 388 <2.5 164	1.79 [0.8–3.8]	0.3
Mental health	>3.5 67 <2.5 34	1.65 [1.17–2.35]	0.05	>3.5 388 <2.5 164	1.29 [0.7–2.2]	0.38
Physical symptoms	>3.5 78 <2.5 19	1.25 [0.95–1.66]	0.12	>3.5 344 <2.5 304	0.34 [0.19–0.6]	0.0001
Stress	>3.5 25 <2.5 47	1.8 [1.34–2.55]	0.0001	>3.5 193 <2.5 311	2.16 [1.2–3.75]	0.006
Work demand	>3.5 11 <2.5 44	8 [5.3–12.3]	<0.0001	>3.5 65 <2.5 345	0.1 [2.9–12.7]	<0.0001
Abilities	>3.5 21 <2.5 9	2.1 [1.1–4.1]	0.02	>3.5 116 <2.5 44	2.42 [0.9–6.3]	0.06
Physical environment	>3.5 37 <2.5 18	2.4 [1.66–3.4]	<0.0001	>3.5 216 <2.5 203	1.23 [0.65–2.35]	0.5
Work activity	>3.5 103 <2.5 2	0.6 [0.3–1.2]	0.1	>3.5 686 <2.5 22	0.3 [0.08–1.6]	0.2
Work activity environment	>3.5 36 <2.5 21	2.76 [1.9–4]	<0.0001	>3.5 253 <2.5 184	2.21 [1.18–4.16]	0.01
Organizational context	>3.5 20 <2.5 38	2.58 [1.78–3.7]	<0.0001	>3.5 133 <2.5 258	2.5 [1.36–4.7]	0.003
Global work environment	>3.5 102 <2.5 2	1.27 [0.6–2.6]	0.5	>3.5 587 <2.5 29	0.5 [0.1–2.3]	0.4
Global work assessment	>3.5 96 <2.5 3	0.56 [0.3–0.9]	0.02	>3.5 663 <2.5 38	0.3 [0.09–1]	0.05
Global health	>3.5 59 <2.5 13	2.18 [0.47–3.2]	0.001	>3.5 298 <2.5 153	0.9 [0.47–1.8]	0.8

For Significant differences *p* is in bold.

3.3. Multivariate Analysis Adjustment

In the multivariate analysis (adjusted for age, gender and experiences in hospital) and in reference with non-HCWs (Table 3), medical residents reported significantly high levels of stress (OR 4.77 [2.48–9.18] $p < 0.001$), worse global health (OR 4 [1.7–9.6] 0.001) and mental health (OR 2.58 [1.3–5.1] $p = 0.02$), a negative perception of work demand (OR 8.25 [3.5–19.6] <0.001), abilities (OR 5.55 [1.56–19.7] 0.008), work activity environment (OR 3.18 [1.5–6.7] 0.02), organizational context (OR 4.9 [2.38–10.4] <0.001) (see Table 3).

Table 3. Multivariate analysis adjusted for confounders including, gender, age, years at workplace. Associations between risk factors and outcomes are presented as odds ratio and 95% confidence intervals.

Outcome	Medical Residents		Other HCWs	
	OR	<i>p</i>	OR	<i>p</i>
Physical health	2.9 [1.12–7.46]	0.02	1.33 [0.78–2.25]	0.28
Mental health	2.58 [1.3–5.1]	0.007	1.51 [1.06–2.17]	0.02
Physical symptoms	0.91 [0.47–1.75]	0.8	1.3 [0.96–1.73]	0.08
Stress	4.77 [2.48–9.18]	<0.001	1.75 [1.25–2.44]	0.001
Work demand	8.25 [3.5–19.26]	<0.0001	7.74 [5–11.9]	<0.0001
Abilities	5.55 [1.56–19.7]	0.008	2.47 [1.26–4.85]	0.008
Physical environment	1.3 [0.62–2.7]	0.47	2.25 [1.56–3.2]	<0.001
Work activity	0.42 [0.08–2.3]	0.32	0.62 [0.31–1.22]	0.16
Work activity environment	3.18 [1.5–6.7]	0.002	2.64 [1.8–3.9]	<0.0001
Organizational context	4.92 [2.38–10.4]	<0.0001	2.8 [1.55–5]	<0.0001

Table 3. Cont.

Outcome	Medical Residents		Other HCWs	
	OR	<i>p</i>	OR	<i>p</i>
Global work environment	1.39 [0.22–8.74]	0.7	1.26 [0.61–2.6]	0.52
Global work assessment	0.43 [0.1–1.75]	0.24	0.53 [0.32–0.9]	0.01
Global health	4 [1.7–9.57]	0.001	2.12 [1.4–3.2]	<0.001

For Significant differences *p* is in bold.

4. Discussion

In a population of hospital workers, medical resident status is a risk factor for stress, worse mental health or global health and negative perception of workload, abilities and organizational modifications. For young physicians in China, Li et al. found a significant increase in the scores for anxiety and depression between 2019 and 2020 and also for fear of violence and observation of violence from patients or their families. Interestingly, such modifications were not found in the period from 2018 to 2019 [18]. When looking at data from the French survey of young surgeons, they found a prevalence of moderate to severe anxiety of 10.7%, depression of 14.6%, and insomnia of 11.5% [8]. In a review of 59 studies on the health impact of the COVID-19 pandemic on HCWs, Muller et al. found that the percentage of anxiety ranged from 9 to 90%, depression from 5 to 51%, those suffering from sleep problems from 34 to 65%, and from distress from 7 to 97% [2]. Young physicians seem to have fewer mental health problems than other HCWs. In a study including 1724 US physicians, the authors found that overall, there was no significant association between trainee status and mental health scores for depression, anxiety and post-traumatic stress disorder (PTSD), but in a group of physicians who treated COVID-19 patients, resident trainees had worse mental health scores [19]. It was confirmed in another study which found a higher prevalence of stress and burnout in trainees who treated COVID-19 patients [20].

Uncertainty about working conditions, organizational modifications at short notice, and higher work demand due to higher numbers of staff or an increased number of hospitalized patients could impact on all HCWs. The questions on psychosocial factors revealed a higher mental health impact on medical residents and that the most common causes of psychosocial burden were job strain, especially the demand of work, organizational factors and personal abilities. Work and personal environment may have triggered the process and appearance of the effect on mental health as shown by the trajectory of burnout syndrome [7]. In a study on 157 HCWs using the Maslach Burnout Inventory, results demonstrated that the burnout syndrome affected more depersonalization aspects. It showed a relationship between the level of depersonalization scale and absence of PPE. In the subscale of emotional exhaustion, physicians and nurses presented higher levels [7]. From March to May 2020, the hospital offered to its staff individual or collective psychological support. Psychologists noted anxiety disorders during the lockdown period; and then right afterwards, there was an increase in the number of suicidal ideations, and a resurgence of latent conflict between units or among employees. The most impacted employees were medical residents and medical unit managers. On the other hand, some positive impacts were reported in some units, with better collective support and an improved sense of purpose at work. We performed telephone consultations but did not develop other forms of psychological support, such as videoconferencing, telehealth or social networking, described as solutions to limit the impact of social isolation and loneliness during lockdown [21]. In this study, medical residents seem to be a more vulnerable population than other HCWs with a higher odds ratio, particularly for mental health, stress and causes of psychosocial burden. For HCWs, the factors reported that correlate with mental health problems include exposure to SARS-Cov2, followed by female gender and worries about getting infected [2]. In contrast, social support and having PPE were correlated with

fewer reports of mental health problems [2,10]. Such protective and risk factors for young physicians and residents were confirmed by other studies [8].

The strategies and resources used by HCWs to help themselves during the pandemic included support from family or friends [2,22,23]. Ironically, some HCWs limited their contact with their friends and family to reduce the risk of infecting them with COVID-19 [24]. In a study in Spain on the general population, performed in May 2020, a number of predictors of lower levels of depressive symptoms were identified. These were following a healthy/balanced diet, following a routine, not reading news/updates about COVID-19 very often, taking the opportunity to pursue hobbies, and staying outdoors or looking outside [25]. In a study on HCWs including nurses, active psychological mechanisms such as mindfulness, or more passive strategies such as distraction were employed [26]. Most of the medical residents in France are far from their families and are isolated from other social relations, and are mostly busy working in contact with their patients. With confinement measures away from others and longer working hours, medical residents were not able to improve their social relationships with their friends, had no time for hobbies and fewer opportunities to prepare a healthy/balanced diet. Due to less experience in care and absence of education on this, medical residents were not able to make use of this approach during the pandemic.

As described by Buseli et al., the SARS-Cov2 pandemic has brought changes in the framework of the work of HCWs, which seems to be acting both positively and negatively on their psychological equilibrium. They found that working on the frontline, or being a physician, positively impacts on compassion satisfaction. Compassion satisfaction may have balanced compassion fatigue in this particular situation [27]. We performed our study two months after confinement measures with less social support to HCWs from society; while Buseli's study was performed during the peak of hospitalization. Collective support and a sense of work were now known to have been a preventive factor against the mental health burden during the crisis [2,26,28]. For the long-term impact, in a cohort study performed in Japan where follow-ups were conducted four times in 2020, the authors found that being an HCW was associated with increased psychological distress at each time of the follow-up [29].

As for mental health burden prevention, particularly for medical residents, in a recent review, clear communication, adequate rest and psychosocial support were associated with reductions in morbidity [30]. For burnout syndrome, actions that considered organizational context, and support and changes in the work environment as prevention processes associated to training can reduce the incidence of the syndrome [31]. In the same way, for medical residents, it has been stated that stressors need to be identified and addressed to improve job satisfaction and reduce psychosocial demands [32]. The role of physicians and their leadership are essential to improve the healthcare of medical resident staff [33].

There are some limitations with the study. Carrying out the survey via internet may have introduced bias including bad-understanding, lack of concentration or bad connection. Data were self-reported, and the time required to complete the questionnaire was almost 15 min, which could have caused an increase in response bias. Lack of data reduced the sensitivity of some analyses and limited the conclusions. More than 15% of medical residents completed the questionnaire. All participants were from the same province, which also limited the generalization of the study findings. There were no data on lifestyle factors, family status or the length of time they had occupied their present work position. The study also lacks a longitudinal follow-up and did not take into account any pre-existing health symptoms or psychosocial factors.

5. Conclusions

There should be an emphasis on the psychological burden of HCWs in occupational and public health interventions and priorities. Action promoting collective support, protective equipment, and the organizational context and framework is important. Developing interventions to reduce the risk of adverse mental health outcomes is imperative.

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References

- Allan, S.M.; Bealey, R.; Birch, J.; Cushing, T.; Parke, S.; Sergi, G.; Bloomfield, M.; Meiser-Stedman, R. The prevalence of common and stress-related mental health disorders in healthcare workers based in pandemic-affected hospitals: A rapid systematic review and meta-analysis. *Eur. J. Psychotraumatol.* **2020**, *11*, 1810903. [[CrossRef](#)] [[PubMed](#)]
- Muller, A.E.; Hafstad, E.V.; Himmels, J.P.W.; Smedslund, G.; Flottorp, S.; Stensland, S.; Stroobants, S.; Van de Velde, S.; Vist, G.E. The mental health impact of the covid-19 pandemic on healthcare workers, and interventions to help them: A rapid systematic review. *Psychiatry Res.* **2020**, *293*, 113441. [[CrossRef](#)] [[PubMed](#)]
- Pappa, S.; Ntella, V.; Giannakas, T.; Giannakoulis, V.G.; Papoutsis, E.; Katsaounou, P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav. Immun.* **2020**, *88*, 901–907. [[CrossRef](#)]
- Vindegaard, N.; Benros, M.E. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav. Immun.* **2020**, *89*, 531–542. [[CrossRef](#)]
- Ng, Q.X.; De Deyn, M.; Lim, D.Y.; Chan, H.W.; Yeo, W.S. The wounded healer: A narrative review of the mental health effects of the COVID-19 pandemic on healthcare workers. *Asian J. Psychiatry* **2020**, *54*, 102258. [[CrossRef](#)] [[PubMed](#)]
- Picard, J.; Cornec, G.; Baron, R.; Saliou, P. Wearing of face masks by healthcare workers during COVID-19 lockdown: What did the public observe through the French media? *J. Hosp. Infect.* **2020**, *106*, 617–620. [[CrossRef](#)]
- Martínez-López, J.; Lázaro-Pérez, C.; Gómez-Galán, J.; Fernández-Martínez, M.D.M. Psychological Impact of COVID-19 Emergency on Health Professionals: Burnout Incidence at the Most Critical Period in Spain. *J. Clin. Med.* **2020**, *9*, 3029. [[CrossRef](#)]
- Vallée, M.; Kutchukian, S.; Pradère, B.; Verdier, E.; Durbant, È.; Ramlugun, D.; Weizman, I.; Kassir, R.; Cayeux, A.; Pécheux, O.; et al. Prospective and observational study of COVID-19's impact on mental health and training of young surgeons in France. *Br. J. Surg.* **2020**, *107*, e486–e488. [[CrossRef](#)]
- Davidov, B.; Gautier, S.; Riom, I.; Landowski, S.; Lawrence, C.; Thiebaut, A.; Bessis, S.; Perronne, V.; Mascitti, H.; Noussair, L.; et al. The first wave of COVID-19 in hospital staff members of a tertiary care hospital in the greater Paris area: A surveillance and risk factors study. *Int. J. Infect. Dis.* **2021**, *105*, 172–179. [[CrossRef](#)]
- García-Fernández, L.; Romero-Ferreiro, V.; López-Roldán, P.D.; Padilla, S.; Calero-Sierra, I.; Monzó-García, M.; Pérez-Martín, J.; Rodríguez-Jimenez, R. Mental health impact of COVID-19 pandemic on Spanish healthcare workers. *Psychol. Med.* **2020**, 1–3. [[CrossRef](#)]
- Lin, K.; Yang, B.X.; Luo, D.; Liu, Q.; Ma, S.; Huang, R.; Lu, W.; Majeed, A.; Lee, Y.; Lui, L.M.; et al. The Mental Health Effects of COVID-19 on Health Care Providers in China. *Am. J. Psychiatry* **2020**, *177*, 635–636. [[CrossRef](#)]
- Burdorf, A.; Porru, F.; Rugulies, R. The COVID-19 (Coronavirus) pandemic: Consequences for occupational health. *Scand. J. Work Environ. Health* **2020**, *46*, 229–230. [[CrossRef](#)]
- Nioi, M.; Napoli, P.E.; Lobina, J.; Fossarello, M.; d'Aloja, E. COVID-19 and Italian Healthcare Workers From the Initial Sacrifice to the mRNA Vaccine: Pandemic Chrono-History, Epidemiological Data, Ethical Dilemmas, and Future Challenges. *Front. Public Health* **2020**, *8*, 591900. [[CrossRef](#)] [[PubMed](#)]
- d'Aloja, E.; Finco, G.; Demontis, R.; Napoli, P.E.; Fossarello, M.; Nioi, M. COVID-19 and medical liability: Italy denies the shield to its heroes. *EClinicalMedicine* **2020**, *25*, 100470. [[CrossRef](#)] [[PubMed](#)]
- Kop, J.L.; Althaus, V.; Formet-Robert, N.; Grosjean, V. Systematic comparative content analysis of 17 psychosocial work environment questionnaires using a new taxonomy. *Int. J. Occup. Environ. Health* **2016**, *22*, 128–141. [[CrossRef](#)] [[PubMed](#)]

16. Langevin, V.B.S. SATIN version 3 health and wellbeing at work questionnaire for assessment, diagnostic and prevention. *Int. J. Occup. Environ. Health* **2018**, *153*, 125–130.
17. Kop, J.-L.; Formet-Robert, N.; Althaus, V.; Grosjean, V. Validation psychométrique croisée de la version 3 de SATIN dans deux échantillons. *Les Notes Sci. Tech. l'INRS* **2016**, *346*, 50.
18. Li, W.; Frank, E.; Zhao, Z.; Chen, L.; Wang, Z.; Burmeister, M.; Sen, S. Mental Health of Young Physicians in China During the Novel Coronavirus Disease 2019 Outbreak. *JAMA Netw. Open* **2020**, *3*, e2010705. [[CrossRef](#)] [[PubMed](#)]
19. Gainer, D.M.; Nahhas, R.W.; Bhatt, N.V.; Merrill, A.; McCormack, J. Association Between Proportion of Workday Treating COVID-19 and Depression, Anxiety, and PTSD Outcomes in US Physicians. *J. Occup. Environ. Med.* **2021**, *63*, 89–97. [[CrossRef](#)] [[PubMed](#)]
20. Kannampallil, T.G.; Goss, C.W.; Evanoff, B.A.; Strickland, J.R.; McAlister, R.P.; Duncan, J. Exposure to COVID-19 patients increases physician trainee stress and burnout. *PLoS ONE* **2020**, *15*, e0237301. [[CrossRef](#)] [[PubMed](#)]
21. Ng, Q.X.; Chee, K.T.; De Deyn, M.; Chua, Z. Staying connected during the COVID-19 pandemic. *Int. J. Soc. Psychiatry* **2020**, *66*, 519–520. [[CrossRef](#)]
22. Awano, N.; Oyama, N.; Akiyama, K.; Inomata, M.; Kuse, N.; Tone, M.; Takada, K.; Muto, Y.; Fujimoto, K.; Akagi, Y.; et al. Anxiety, Depression, and Resilience of Healthcare Workers in Japan During the Coronavirus Disease 2019 Outbreak. *Intern. Med.* **2020**, *59*, 2693–2699. [[CrossRef](#)]
23. Tomlin, J.; Dalgleish-Warburton, B.; Lamph, G. Psychosocial Support for Healthcare Workers During the COVID-19 Pandemic. *Front. Psychol.* **2020**, *11*, 1960. [[CrossRef](#)] [[PubMed](#)]
24. Vieta, E.; Pérez, V.; Arango, C. Psychiatry in the aftermath of COVID-19. *Rev. Psiquiatr. Salud Ment.* **2020**, *13*, 105–110. [[CrossRef](#)] [[PubMed](#)]
25. Fullana, M.A.; Hidalgo-Mazzei, D.; Vieta, E.; Radua, J. Coping behaviors associated with decreased anxiety and depressive symptoms during the COVID-19 pandemic and lockdown. *J. Affect. Disord.* **2020**, *275*, 80–81. [[CrossRef](#)] [[PubMed](#)]
26. Sun, N.; Wei, L.; Shi, S.; Jiao, D.; Song, R.; Ma, L.; Wang, H.; Wang, C.; Wang, Z.; You, Y.; et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. *Am. J. Infect. Control* **2020**, *48*, 592–598. [[CrossRef](#)]
27. Buselli, R.; Corsi, M.; Baldanzi, S.; Chiumiento, M.; Del Lupo, E.; Dell'Oste, V.; Bertelloni, C.A.; Massimetti, G.; Dell'Oste, L.; Cristaudo, A.; et al. Professional Quality of Life and Mental Health Outcomes among Health Care Workers Exposed to Sars-Cov-2 (Covid-19). *Int. J. Environ. Res. Public Health* **2020**, *17*, 6108. [[CrossRef](#)]
28. Cai, H.; Tu, B.; Ma, J.; Chen, L.; Fu, L.; Jiang, Y.; Zhuang, Q. Psychological Impact and Coping Strategies of Frontline Medical Staff in Hunan Between January and March 2020 During the Outbreak of Coronavirus Disease 2019 (COVID-19) in Hubei, China. *Med. Sci. Monit.* **2020**, *26*, e924171.
29. Sasaki, N.; Asaoka, H.; Kuroda, R.; Tsuno, K.; Imamura, K.; Kawakami, N. Sustained poor mental health among healthcare workers in COVID-19 pandemic: A longitudinal analysis of the four-wave panel survey over 8 months in Japan. *J. Occup. Health* **2021**, *63*, e12227. [[CrossRef](#)]
30. Kisely, S.; Warren, N.; McMahon, L.; Dalais, C.; Henry, I.; Siskind, D. Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers: Rapid review and meta-analysis. *BMJ* **2020**, *369*, m1642. [[CrossRef](#)]
31. Ruotsalainen, J.H.; Verbeek, J.H.; Mariné, A.; Serra, C. Preventing occupational stress in healthcare workers. *Cochrane Database Syst. Rev.* **2015**, *2015*, Cd002892. [[CrossRef](#)] [[PubMed](#)]
32. Fernández-Prada, M.; González-Cabrera, J.; Iribar-Ibabe, C.; Peinado, J.M. Psychosocial risks and stress as predictors of burnout in junior doctors performing emergency guards. *Gac. Med. Mex.* **2017**, *153*, 450–458. [[CrossRef](#)] [[PubMed](#)]
33. Singh, P. Why COVID-19 pandemic builds a convincing case for investing in 'Young Physician Leaders (YPL)'. *J. Fam. Med. Prim. Care* **2020**, *9*, 5432–5434. [[CrossRef](#)] [[PubMed](#)]