The risk of post-traumatic stress disorder (PTSD) in Italian Highly Specialized Research Hospitals staff within two months of the pandemic declaration: an on-line survey

Sylvie HMJ Piacentini[1], **Irene Tramacere**[2] and **Sara Prioni**[1]

[1]*Struttura Semplice di Neuropsicologia Clinica, Fondazione IRCCS Istituto Neurologico Carlo Besta, Milan, Italy*
[2]*Dipartimento di Ricerca e Sviluppo Clinico, Fondazione IRCCS Istituto Neurologico Carlo Besta, Milan, Italy*

Abstract

Background. The whole hospital system was stressed and at risk in the first phase of the pandemic. This study examined the prevalence of post-traumatic stress disorder (PTSD) in all hospital staff, medical and non-medical, within two months of the pandemic declaration. Survey concerned staff 4510 health workers of Italian Highly Specialized Research Hospitals.

Method. Subjects were asked to complete an on-line self-reported questionnaire, the PTSD Checklist 5 (PCL-5) and subjective perception of safety related to personal protective equipment (PPE).

Results. The sample included staff working in hospitals with or without COVID-19 patient admissions. Overall, 11.56% of the hospitals staff met the symptoms criteria for probable PTSD. The sample included 80.63% (3467) medical staff workers and 19.37% (833) non-medical staff workers. The 31.91% of participants worked in COVID-19 hospitals/wards. The prevalence of positive screening for PTSD symptoms in medical staff was 12.42% (426) and in non-medical staff, 8.59% (70). Among medical staff, anesthesiologists had a significant prevalence of PTSD (22.35%), followed by health care assistants/technicians (15.38%) and physicians (10.11%). Among non-medical staff, personnel involved in cleaning, catering, maintenance, security, and transportation, the symptoms of PTSD reached a rate of 12.24% and in administrative staff 8.47%. Risk factors associated with PTSD included working as an anesthesiologist, perceiving PPE as inadequate, and working in COVID-19 hospitals/wards.

Conclusions. In the present study, as in other studies, the prevalence of PTSD symptoms among hospital workers was significatively higher than the lifetime prevalence of PTSD in the general population, showing the pandemic's incredible impact.

INTRODUCTION

Italy was the first nation in Europe to implement lockdown measures to deal with the COVID-19 pandemic. The Italian National Health System has been overwhelmed, collapsed under the number of infected patients, with huge losses. The novel coronavirus SARS-CoV-2-causing COVID-19, first spread in China in late December 2019, was declared a pandemic by the World Health Organization on 11th March 2020. Italy has been one of the most affected countries and, in April 2020, became the epicenter of the spreading pandemic.

As well as other nations, frontline Italian health care workers experienced high rates of infection and death partly due to inadequate access to personal protective equipment (PPE) (i.e. gloves, face shields, gowns, and hand sanitizer) [1].

During the pandemic, the Italian government separated hospitals into COVID-19 and non-COVID-19 patient admissions.

Health care workers have been exposed to emotional

Address for correspondence: Sylvie Piacentini, Fondazione IRCCS Istituto Neurologico Carlo Besta, Via Celoria 11, 20133 Milan, Italy. E-mail: sylvie.piacentini@istituto-besta.it.

overload for the risk of infection, ethical issues related to decision-making, constant vigilance, reorganization of workspaces, and physical exhaustion. Moreover, they had to face a high number of deaths among patients, colleagues, and loved ones and often prolonged separation from the family [2, 3]. Non-medical staff also has been under pressure to follow the national and regional directives, which required continuous updating and operational decisions based on the local situation and timely decisions in unforeseen conditions. Hospital management had to make countless decisions (e.g., managing intensive care units, setting up new "COVID-19 blocks", postponing elective surgeries to prepare for a spike in coronavirus cases, and redeploying staff).

These unprecedented circumstances were likely to increase the risk of mental health disorders such as post-traumatic stress disorder (PTSD) [4, 7], the sentinel mental health consequence of natural disaster exposure. Many studies had shown that health care workers were likely to suffer from PTSD after participating in an emergency both for the COVID-19 pandemic and for the previous infectious outbreaks (severe acute respiratory syndrome, SARS; Middle East respiratory syndrome, MERS) [5-9]. PTSD individuals are more at risk of suicidal ideation, suicide attempt, and deaths by suicide, even considering that health care workers are previously at-risk occupations [6] because burnout (chronic work-related stress) is already present. Exposure to work-related stressors is expected to have long-term psychological consequences for many healthcare professionals [10].

Guidelines for post-traumatic stress disorder of the National Institute of Health and Care Excellence recommend "for people at high risk of developing PTSD after a major disaster, those responsible for coordinating the disaster plan should think about the routine use of a validated, brief screening instrument for PTSD at one month after the disaster (NG 116, 2018)".

The aim of the study was to rapidly identify the number of people at risk, to set appropriate strategies to provide evidence-based support or care [4].

In this study, we observed the prevalence of PTSD symptoms in health care professionals in close contact with patients (physician, nursing staff, health care assistants, and technicians) and non-medical staff (hospital administrators, administrative staff, maintenance estates workers) from twenty-four out of fifty-one Italian IRCCS (Istituto di Ricovero e Cura a Carattere Scientifico, Italian Scientific Institute for Research, Hospitalization,and Healthcare) through an anonymous, on-line self-check tool. Although the risk of PTSD for healthcare professionals has been well documented [6-9], it is not for non-medical staff.

Hospital administration should take proactive steps to minimize the impact of COVID-19 in health care workers because early interventions may mitigate the mental health impact on health care workers and non-medical staff [11].

METHODS AND MATERIALS
Study setting and population

Hospital workers (health care professionals and non-medical workers) were asked to complete a self-reported questionnaire, the PTSD Checklist 5 (PCL-5). An on-line survey ran continuously from 14 April to 24 May 2020 to estimate the proportion of PTSD symptoms in hospital staff since one month after the pandemic declaration of COVID-19 (11 March 2020). A sample of 4510 participants was recruited from Italian IRCCS hospitals. IRCCS (Istituto di Ricovero e Cura a Carattere Scientifico, literally "Scientific Institute for Research, Hospitalization, and Healthcare") are hospitals granted by The Italian Department of Health as a benchmark for the whole public health system for both the quality of patient care and the innovation skills. The study received ethical approval from the Human Research Ethics Board of IRCCS Neurological Institute Carlo Besta of Milan.

On-line survey

The survey consisted of demographics, the PCL-5 Checklist, and questions about the safety perception related to PPE.

DSM-5-based PTSD Checklist (PCL-5) is one of the most widely used self-report questionnaires for PTSD [12]. The PCL-5 has a variety of purposes, including screening individuals for PTSD. It takes approximately 5-10 minutes to complete. The PCL-5 evaluates the degree to which an individual has been bothered in the past month by DSM-5 PTSD symptoms. Criterion A was established a priori in the questionnaire by asking participants to report their responses to the COVID-19 pandemic. Checklist items are rated from 0 ("not at all") to 4 ("extremely"). Subscale severity scores are calculated by summing items in each of the four DSM-5 PTSD symptom clusters: Criterion B intrusions (Items 1-5), Criterion C avoidance (Items 6-7), Criterion D negative change in cognitions and mood (Items 8-14), Criterion E change in arousal and reactivity (Items 15-20), presence/absence of dissociative symptoms (depersonalization/derealization). A provisional PTSD diagnosis can be made by treating each item rated as 2 = "moderately" or higher as a symptom endorsed, then following the DSM-5 diagnostic rule, which requires at least: 1 B item (questions 1-5), 1 C item (questions 6-7), 2 D items (questions 8-14), 2 E items (questions 15-20). This symptom cluster scoring method is well established [13].

The safety perception related to PPE was measured with a 5-point Likert scale ranging from 0 ("very poor") to 4 ("excellent").

Procedure

The on-line survey was conducted from 14 April 2020 through 24 May 2020. The Authors drafted an invitation letter with a link to the survey (Microsoft FORMS application). The management of each hospital sent employees the survey invitation email (survey closed - personal e-mail with password). Participants clicked on the link to agree to take part to gain access to the questionnaire. The banner provided the only link to the survey. The survey did not use cookies and neither collected user internet protocol (IP) addresses nor stored them with the submitted data. Further, it did not record any identifying information of the responder, nor did it ask for any protected health information identifiers. The data collection link remained active for each IRCCS

for 15 days, starting from the first response received.

The first page of the survey provided the responder with essential information regarding the purpose of the study, a statement regarding the host institution and regulatory approval from the institution, and approximate completion time. Multiple checkboxes provided multiple checkboxes, rating scales, yes/no questions, or specific fill in the blank questions. No open-ended questions or queries that required free text entry were used. Our survey adheres to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [14] this paper provides the first comprehensive review of its diagnostic utility. Eighteen diagnostic accuracy studies of the PCL are presented, followed by an examination of the potential roles of spectrum effects, bias, and prevalence in understanding the variation in sensitivity, specificity, and other operating characteristics across these studies. Two related issues as to the interchangeability of the PCL's three versions (civilian, military, and specific and UE Regulation 2016/679 concerning the processing of personal data.

Other data were collected about gender, age, educational level, hospital staff role (medical/non-medical), job qualification (physician in contact with patients or biological material; anesthesiologist; non-physician staff in contact with patients or biological material; health care assistants and technicians; researchers; administrative staff; other: cleaning, catering, maintenance, security, transport staff), affiliation to hospital/ward dedicated to COVID-19 patients (COVID-19 *vs* non-COVID-19 hospital/ward) and subjective perception of safety related to PPE.

Study outcomes

First, we analyzed PTSD prevalence in the overall sample to investigate the burden of trauma in health care professionals in close contact with patients and non-medical staff during the COVID-19 pandemic. Second, a subgroup analysis of the prevalence of PTSD by the socio-demographic variable as gender, age was conducted. Third, we sort prevalence of PTSD by hospital staff role (medical/non-medical) and by job qualification (physician in contact with patients or biological material; anesthesiologist; non-physician staff in contact with patients or biological material; health care assistants and technicians; researchers; administrative staff; other: cleaning, catering, maintenance, security, transport staff). Forth, we explore the prevalence of PTSD symptoms in hospital workers more exposed to COVID-19 at work (COVID-19 *vs* non-COVID-19 hospital/ward). Fifth, we assess the association of PTSD and a hospital/ward with COVID-19 patients or not and subjective perception of safety related to PPE. Sixth we examined a cluster prevalence of PTSD ("intrusions", "avoidance", "negative change in cognitions and mood", "change in arousal and reactivity"). Finally, to examine risk prediction of PTSD, we tested whether socio-demographic data (independent variables), COVID-19 *vs* non-COVID-19 hospital/ward, staff role, job qualification and PPE safety perception predicted PTSD in hospital workers (dependent variable) using bivariate and multivariate logistic regression analyses.

Statistical analyses

A sample size of about 3500 participants was estimated to be appropriate to meet the study's primary objective, which was to evaluate the prevalence of PTSD symptoms in hospital workers. Assuming that in previous infectious outbreaks (SARS and MERS), the prevalence of PTSD in health care professionals reported varied between 10% and 40% [15], based on Wald's approximate binomial method, the number of 3500 subjects would have guaranteed a margin of error not exceeding ± 2% (i.e., a 95% confidence interval, 95% CI, width equal to 4%).

Appropriate descriptive analysis was provided; in particular, the qualitative variables were summarized through the absolute and percentage frequency distributions. Regarding the primary endpoint, adequate point and interval estimates were provided for proportions, using the Wald approximate binomial method. The chi-square test and the multivariate logistic model were used to investigate the association between risk factors and PTSD. P-values <0.05 were considered statistically significant, and all tests were two-tailed. Statistical analyses were performed using STATA statistical software, version 16 (StataCorp. 2019. Stata Statistical Software: Release 16. College Station, TX: StataCorp LLC).

RESULTS
Participants

Twenty-four out of fifty-one Italian IRCCS participated (*Figure 1*). The total number of hospital workers responders was 4510. Incomplete PCL-5 Checklist (n=17) or atypical timestamp (n=6) submission (inferior to 2 minutes) were excluded, leaving a total group of 4487 respondents (*Table 1*). Numbers may not add up due to missing data about gender, age, educational level, hospital staff role, job qualification, COVID-19 *vs* non-COVID-19 hospital/ward or subjective percep-
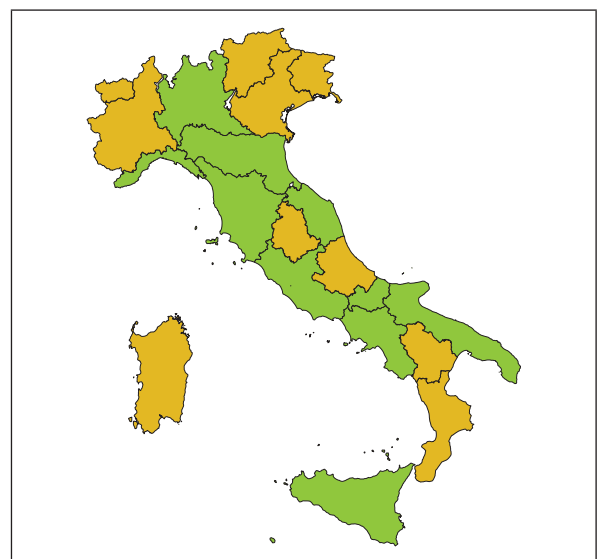
Figure 1
Regional location of participants IRCCS (green) in Italy.

Table 1
Socio-demographic characteristics of the surveys' participants

	N. total (weighted %)
Total N. subjects	4487
Gender	
Male	1266/4468 (28.33%)
Female	3202/4468 (71.67%)
Age	
18-30	479/4478 (10.70%)
31-50	2277/4478 (50.85%)
51-65	1656/4478 (36.98%)
66-75	62/4478 (1.38%)
> 75	4/4478 (0.09%)
Educational Level	
Middle School	99/4231 (2.34%)
High School	858/4231 (20.28%)
University	3274/4231 (77.38%)
Staff	
Medical staff	3467/4300 (80.63%)
Physicians in contact with patients and/or biological material	808/4300 (18.79%)
Anaesthesiologists	87/4300 (2.02%)
Non-physician staff in contact with patients and/or biological material	157/4300 (3.65%)
Health care assistants and technicians (nursing, physiotherapy, laboratory/radiology)	1742/4300 (40.51%)
Researchers	673/4300 (15.65%)
Non-medical staff	833/4300 (19.37%)
Administrative staff (hospital administration and management)	773/4300 (17.98%)
Other (cleaning, catering, maintenance, security, transport staff)	49/4300 (1.14%)
Volunteers	11/4300 (0.26%)
Workplace	
COVID-19 hospitals/wards	1423/4460 (31.91%)
Non-COVID-19 hospitals/wards	3037/4460 (68.09%)

tion of safety related to PPE. The majority of responders, 71.67% (3202), were females; 50.85% aged 31-50 years (2277), and the university educational level was the most representative (3274; 77.38%). Among the respondents, 80.63% (3467) were medical staff workers, and 19.37% (833) were non-medical staff workers. Healthcare assistants and technicians (nursing, physiotherapy, laboratory/radiology) were the most representative: 1742 (40.51%). The 31.91% (1423) of participants worked in COVID-19 hospitals/wards.

Our sample is representative of the general gender and staff organizational structure of the Italian hospital workers. Based on the entire staff of IRCCS hospitals, females represent 67.3%, medical staff workers represent 86.2% (physician 14.5%, non-physician staff

3.1%, health care assistants and technicians 60.4%, and researcher 8.1%) compared to non-medical staff [16].

Prevalence of PTSD symptoms

Overall, 511 out of 4429 (11.6%, 95% CI 10.6%-12.5%) of hospital workers met PTSD symptom criteria (BCDE) *(Table 2)*.

PTSD symptoms were more frequent in female (392, 12.41%) than male (117, 9.33%) participants (p-value 0.004). PTSD symptoms were significantly related to educational level, with a higher prevalence among participants with high school degree (126, 14.89%) compared to those with middle school diploma (11, 11.83%) and the university degree (349, 10.76%) (p-value 0.004).

The prevalence of positive screening for PTSD symptoms in medical staff was 12.42% (426) and in non-medical staff, 8.59% (70). Among medical staff, anesthesiologists (a category chosen a priori by authors for their specific role in the care of COVID-19) had the most significant percentage of PTSD symptoms (19, 22.35%), followed by health-care assistants and technicians (264, 15.38%) and physician in contact with patients or biological material (81, 10.11%) *(Figure 2)*.

The same trend was observed for COVID-19 and non-COVID 19 hospitals/wards, with a significant increase in PTSD cases in COVID-19 hospitals/wards.

Regarding the lack of PPE, 59.7% of responders with probable PTSD rated as inadequate PPE (range 0-1) with no significant difference between COVID-19 and non-COVID-19 hospitals/ward (p = 0.385).

Concerning symptom clusters, intrusive symptoms were considered relevant ("moderately" or higher) in 41.3% (1852 responders), avoidance in 37.0% (1653), changes in arousal in 36.3% (1628), a negative change in cognitions and mood in 33.7% (1510). Dissociative symptoms were present as derealization in 39.1% (1638) and depersonalization in 25.0% (1118) (data not shown).

Factors associated with PTSD symptoms

Results of the multivariate logistic regression analysis (see *Table 3*) showed that female were more likely to develop PTSD (adjusted odds ratio, OR, 1.43; 95% CI 1.13-1.81) as compared with the male.

Respondents with lower educational level were more likely to develop PTSD compared to participants with the university degree, OR was 1.62 (1.26-2.08) for participants with high school, and 1.23 (0.63-2.41) for participants with middle school diploma.

When examining job qualification, the major risk for PTSD symptoms was for anesthesiologist 3.14 (1.68-5.84), for cleaning, catering, maintenance, security, transport staff 1.94 (0.76-4.95) and medical staff (excluding anesthesiologist) 1.69 (1.32-2.16).

The probability of developing symptoms of PTSD was 2.03 (1.64-2.51) times higher for respondents working in COVID-19 hospitals/wards than respondents who worked in non-COVID-19 hospitals/wards.

The chances of developing PTSD were 2.22 (1.77-2.77) times higher among respondents who had poor or very poor PPE safety perception compared to fair safety perception.

Table 2
Post-traumatic stress disorder (PTSD) prevalence in COVID-19 and non-COVID-19 hospitals

| | PTSD prevalence | | | | | |
	Overall	p	COVID-19 hospitals/wards	p	Non-COVID-19 hospitals/wards	p
	511 (11.56%)		246 (17.52%)		265 (8.82%)	0.000
Gender						
Male	117 (9.33%)	0.004	74 (15.38%)	0.120	43 (5.64%)	0.000
Female	392 (12.41%)		172 (18.72%)		219 (9.81%)	
Age						
18-30	62 (13.00%)	0.485	27 (20.45%)	0.708	35 (10.14%)	0.510
31-50	246 (10.91%)		127 (16.87%)		118 (7.90%)	
51-65	197 (12.11%)		90 (17.93%)		107 (9.57%)	
66-75	5 (8.47%)		1 (7.69%)		4 (8.89%)	
> 75	0 (0.00%)		0 (0.00%)		0 (0.00%)	
Educational level						
Middle School	11 (11.83%)	0.004	62 (23.13%)	0.011	64 (11.13%)	0.168
High School	126 (14.89%)		5 (21.74%)		6 (8.70%)	
University	349 (10.76%)		157 (15.48%)		64 (11.13%)	
Staff						
Medical staff	426 (12.42%)	0.000	217 (18.84%)	0.002	208 (9.16%)	0.014
Physicians in contact with patients and/or biological material	81 (10.11%)		48 (14.41%)		33 (7.10%)	
Anaesthesiologists	19 (22.35%)		15 (24.59%)		4 (16.67%)	
Non-Physician staff in contact with patients and/or biological material	12 (7.64%)		5 (10·00%)		7 (6.54%)	
Health care assistants and technicians (nursing, physiotherapy, laboratory/radiology)	264 (15.38%)		142 (22.02%)		122 (11.39%)	
Researchers	50 (7.46%)		7 (11.11%)		42 (6.95%)	
Non-medical staff	70 (8.59%)		26 (11.66%)		44 (7.50%)	
Administrative staff (Hospital administration and management)	64 (8.47%)		22 (11.00%)		42 (7.61%)	
Other (cleaning, catering, maintenance, security, transport staff)	6 (12.24%)		4 (18.18%)		2 (7.69%)	
Volunteers	0 (0.00%)		0 (0.00%)		0 (0.00%)	

p are p-values from chi-square tests.
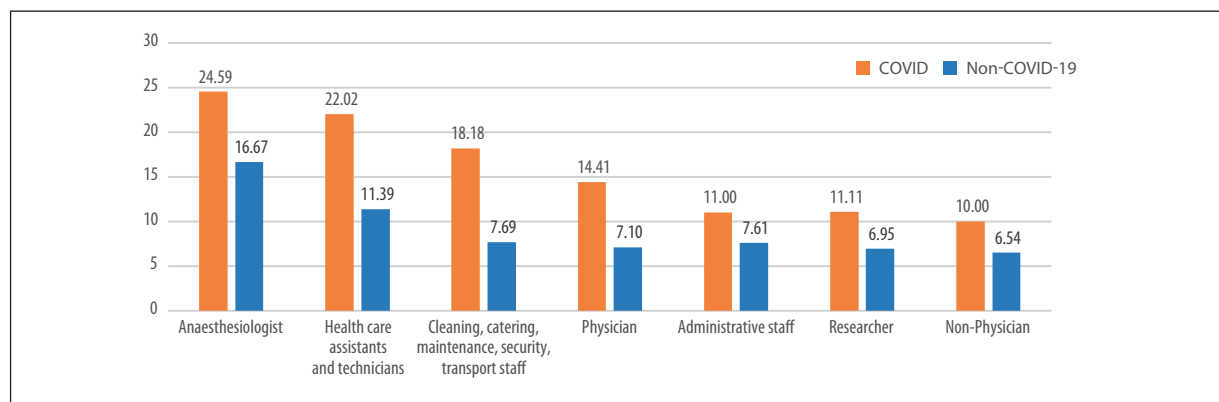
Figure 2
Percentage of respondents with post-traumatic stress disorder (PTSD) symptoms.

Table 3

Independent predictors of post-traumatic stress disorder (PTSD) from multivariate logistic regression analysis

		Odd ratio (95% CI)	p value
Gender	Male	1 (ref)	
	Female	1.430351	0.003
Age	18-30	1 (ref)	
	31-50	0.7964101	0.181
	>50	0.8399574	0.329
Educational level	University	1 (ref)	
	High School	1.616833	0.000
	Middle School	1.234976	0.537
Staff	Non-medical staff	1 (ref)	
	Medical staff	1.689937	0.000
	Anaesthesiologist	3.135096	0.000
	Other	1.939316	0.166
Hospitals/wards	Non-COVID-19	1 (ref)	
	COVID-19	2.029542	0.000
PPE safety perception	Fair		
	Poor/very poor	2.216694	0.000
	Good/excellent	0 .896858	0.562

PPE: personal protective equipment.

DISCUSSION

Following National Institute for Health and Care Excellence's recommendations to rapidly evaluate the mental health impact of hospital workers, we decided to take advantage of the on-line survey. An on-line survey can be easily deployed and completed by participants, particularly when disseminated via e-mail with minimal costs. Mainly, the completion of survey questionnaires on-line could have been answered at the convenience of responders, at their own pace, as they were facing the pandemic.

In this study, the prevalence of PTSD among hospital workers was 11% when the lifetime prevalence of PTSD in Italy is about 2.4% in the general population [17], showing the significant impact of the pandemic [18,19].

The major risk of the female having PTSD symptoms, detected in our study, is in line with current research that observes that the lifetime risk for PTSD in women is twice that in men. Literature offers competing explanations for this observation that might reflect a combination of greater exposure and genetic vulnerability [20].

Working in COVID hospitals/wards is related to two times the probability of developing PTSD symptoms with respect to non-COVID hospitals/wards.

In the present study, anesthesiologists, core figures of health care emergency during COVID-19 spread, are those with higher rate (22%) with a chance three times more likely of developing PTSD symptoms with respect to other categories.

This study clearly evidence that the risk of developing PTSD disorder not only regards health care profession-

als in close contact with patients but also those who silently work backstage, such as administrative employees and all non-medical staff [21-23].

Since a critical symptom of PTSD involves avoiding environments related to the traumatic event, hospitals workers traumatized at work often have extreme difficulty returning to their place of employment with the negative consequences of absenteeism and decreased productivity [24].

Healthcare professionals' perception of inadequate PPE during the current pandemic has been a possible factor influencing our global results because most responders with probable PTSD rated as inadequate PPE. Protective factors can provide valuable insights into the variability of individuals' responses to COVID-19.

Interesting is the massive presence of dissociative reactions with a prevalence of derealization symptoms. Derealization is the feeling of being disconnected from one's surrounding environment and, in this case, probably triggered by fundamental changes in the way of life in this pandemic event (fear, lockdown, employment of army, etc.). Dissociative reactions are associated with more severe PTSD symptoms and decreased functioning [25].

Three major limitations regarding this study must be considered. Firstly, the gold standard for diagnosing PTSD is a structured clinical interview and the PCL-5 can be scored only to provide a provisional PTSD diagnosis. Secondly, we explicitly investigated the PTSD symptoms related to the outbreak establishing a priori criterion A (DSM-IV), asking participants to report their responses to the COVID-19 pandemic. It cannot be excluded that some subjects had a pre-existing post-traumatic stress disorder linked to a different traumatic experience since previous traumas have not been investigated. Thirdly, the assessment of PTSD is examined regardless of the time of assessment, which ranges from 1 year to a few years, sometimes decades after the disaster [26]. Only a few studies, such as the present, have documented PTSD one to six months after trauma [27, 28]. Therefore, PTSD studies are limited in comparability. The Clinical Neuropsychological Service of our Institute (IRCCS Carlo Besta Neurological Institute) has set up a prompt psychological intervention team based on existing resources and capacities in association with the survey. Further, we quickly shared the survey results with the other involved IRCCS.

CONCLUSIONS

Considering that an on-line survey inevitably produces distortions and limited generalizability, conventional methods were not feasible during the pandemic. To reduce the distortions: the main tool for PTSD screening was administered; scores with the most stringent method (to limit false positives) were calculated; available guidelines and the European privacy laws for the collection of data with on-line survey were applied. Finally, sample size is reliable and representative of the target population.

The timely collection of information from employees is the first step towards local solutions and facilitates support for the most vulnerable staff. Psychological interven-

ORIGINAL ARTICLES AND REVIEWS

tions can reduce the severity of PTSD when the intervention is targeted at those with early symptoms [29], and psychotherapy is generally recommended as a first-line treatment [30]. This maximizes the opportunity for staff to experience psychological growth from overcoming the challenges faced during the pandemic [4, 31, 32].

Authors' contributions

SHMJP and SP conceived and designed the study and wrote the manuscript. IT acquired and analyzed data.

All Authors interpreted the data, revised the manuscript for important intellectual content, and agreed with this article's results and conclusions.

Conflict of interest statement

The Authors declare no competing interests.

REFERENCES

1. Ranney ML, Griffeth V, Jha AK. Critical supply shortages - The need for ventilators and personal protective equipment during the Covid-19 pandemic. N Engl J Med. 2020;382:e41. doi: 10.1056/NEJMp2006141
2. El-Hage W, Hingray C, Lemogne C, et al. Health professionals facing the coronavirus disease 2019 (COVID-19) pandemic: What are the mental health risks? Encephale. 2020;46(3S):S73-S80. doi: 10.1016/j.encep.2020.04.008
3. Tomlin J, Dalgleish-Warburton B, Lamph G. Psychosocial support for healthcare workers during the COVID-19 pandemic. Front Psychol. 2020;11;11:1960. doi: 10.3389/fpsyg.2020.01960
4. Greenberg N. Mental health of health-care workers in the COVID-19 era. Nat Rev Nephrol. 2020;16(8):425-6. doi: 10.1038/s41581-020-0314-5
5. Saragih ID, Tonapa SI, Saragih IS, et al. Global prevalence of mental health problems among healthcare workers during the Covid-19 pandemic: A systematic review and meta-analysis. Int J Nurs Stud. 2021;121:104002. doi: 10.1016/j.ijnurstu.2021.104002
6. Dutheil F, Mondillon L, Navel V. PTSD as the second tsunami of the SARS-Cov2 pandemic. Psychol Med. 2021;51(10):1773-4. doi: 10.1017/S0033291720001336
7. Song X, Fu W, Liu X, et al. Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China. Brain Behav Immun. 2020;88:60-5. doi: 10.1016/j.bbi.2020.06.002
8. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA Netw Open. 2020;3(3):e203976. doi: 10.1001/jamanetworkopen.2020.3976
9. Carmassi C, Foghi C, Dell'Oste V, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. Psychiatry Res. 2020;292:113312. doi: 10.1016/j.psychres.2020.113312
10. Sutherland CL, Cooper VJ. Understanding stress: A psychological perspective for health professionals. (Psychology and health series, vol. 5). London: Chapman & Hall; 1990.
11. Panagioti M, Geraghty K, Johnson J, et al. Association between physician burnout and patient safety, professionalism, and patient patisfaction: A systematic review and meta-analysis. JAMA Intern Med. 2018;1;178(10):1317-31. doi: 10.1001/jamainternmed.2018.3713
12. Blevins CA, Weathers FW, Davis M T, Witte TK, Domino JL. The Posttraumatic stress disorder Checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. J Trauma Stress. 2015;28(6):489-98. doi: 10.1002/jts.22059
13. McDonald SD, Calhoun PS. The diagnostic accuracy of the PTSD Checklist: A critical review. Clin Psychol Rev. 2010;30(8):976-87. doi: 10.1016/j.cpr.2010.06.012
14. Eysenbach G. Improving the quality of web surveys: The Checklist for reporting results of internet e-surveys (CHERRIES). J Med Internet Res. 2004;6(3):1-6. doi: 10.2196/jmir.6.3.e34
15. Salazar de Pablo G, Vaquerizo-Serrano J, Catalan A, et al. Impact of coronavirus syndromes on physical and mental health of health care workers: Systematic review and meta-analysis. J Affect Disord. 2020;1;275:48-57. doi: 10.1016/j.jad.2020.06.022
16. Ministero della Salute. Covid -19, i casi in Italia 24 maggio ore 18. Available from: www.salute.gov.it/portale/nuovocoronavirus/dettaglioNotizieNuovoCoronavirus.jsp?lingua=italiano&menu=notizie&p=dalministero&id=4807.
17. Koenen KC, Ratanatharathorn A, Ng L, et al. Post-

traumatic stress disorder in the world mental health surveys. Psychol Med. 2017;47(13):2260-74. doi: 10.1017/S0033291717000708

18. Moreno C, Wykes T, Galderisi S, et al. How mental health care should change as a consequence of the COVID-19 pandemic. Lancet Psychiatry. 2020;7(9):813-24. doi: 10.1016/S2215-0366(20)30307-2

19. Shanafelt T, Ripp J, Trockel M. Understanding and addressing sources of anxiety among health care professionals during the COVID-19 pandemic. JAMA. 2020;2;323(21):2133-4. doi: 10.1001/jama.2020.5893

20. Kessler RC, Sonnega A, Bromet E, Hughes M, Nelson CB. Posttraumatic stress disorder in the National Comorbidity Survey. Arch Gen Psychiatry. 1995;52(12):1048-60. doi: 10.1001/archpsyc.1995.03950240066012

21. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. Psychiatry Res. 2020;288:112936. doi: 10.1016/j.psychres.2020.112936

22. Yin Q, Sun Z, Liu T, et al. Posttraumatic stress symptoms of health care workers during the corona virus disease 2019. Clin Psychol Psychother. 2020;27(3):384-95. doi: 10.1002/cpp.2477

23. Sanghera J, Pattani N, Hashmi Y, et al. The impact of SARS-CoV-2 on the mental health of healthcare workers in a hospital setting: A systematic review. J Occup Health. 2020;62(1):e12175. doi: 10.1002/1348-9585.12175

24. Stergiopoulos E, Cimo A, Cheng C, Bonato S, Dewa CS. Interventions to improve work outcomes in work-related PTSD: A systematic review. BMC Public Health. 2011;31;11:838. doi: 10.1186/1471-2458-11-838

25. Zoellner LA, Bedard-Gilligan MA, Jun JJ, Marks LH, Garcia NM. The evolving construct of posttraumatic stress disorder (PTSD): DSM-5 criteria changes and legal implications. Psychol Inj Law. 2013;1;6(4):277-89. doi: 10.1007/s12207-013-9175-6

26. Galea S, Nandi A, Vlahov D. The epidemiology of posttraumatic stress disorder after disasters. Epidemiol Rev. 2005;27:78-91. doi: 10.1093/epirev/mxi003

27. Galea S, Ahern J, Resnick H, et al. Psychological sequelae of the September 11 terrorist attacks in New York City. N Engl J Med. 2002;346:982-7. doi: 10.1056/NEJMsa013404

28. Hanson RF, Kilpatrick DG, Freedy JR, Saunders BE. Los Angeles county after the 1992 civil disturbances: Degree of exposure and impact on mental health. J Consult Clin Psychol. 1995;63(6):987-96. doi: 10.1037/0022-006x.63.6.987

29. Kliem S, Kröger C. Prevention of chronic PTSD with early cognitive behavioral therapy: A meta-analysis using mixed-effects modeling. Behav Res Ther. 2013;51(11):753-61. doi: 10.1016/j.brat.2013.08.005

30. Yehuda R, Hoge CW, McFarlane AC, et al. Post-traumatic stress disorder. Nat Rev Dis Primers. 2015;8;1:15057. doi: 10.1038/nrdp.2015.57

31. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. BMJ. 2020;26;368:m1211. doi: 10.1136/bmj.m1211

32. Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. Eur Heart J Acute Cardiovasc Care. 2020;9(3):241-7. doi: 10.1177/2048872620922795

Original articles and reviews