Pandemic COVID-19: the residents' resilience

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Summary. *Background and aim of the work*: Healthcare workers are often exposed to secondary traumatic stress. The SARS-CoV-2 outbreak caused intense psychological pressure in various healthcare professionals, with increased risk of post-traumatic stress disorder. Objective of our study was to evaluate the incidence of post-traumatic stress disorder in italian residents in Intensive Care and Emergency Departments facing COVID-19 emergency. *Methods*: We developed a short, anonymous web-questionnaire to obtain data regarding sociodemographic, professional characteristics, history of psychological trauma, psychotherapy, use of psychiatric medications and the presence of symptoms of post-traumatic stress disorder. Primary outcome was the incidence of post-traumatic stress disorder. Secondary endpoint was to identify possible risk factors associated with the development of post-traumatic stress disorder. Post-traumatic stress disorder symptoms were assessed by the Impact of Event Scale-Revised. A cut-off of 33 identified a probable diagnosis of post-traumatic stress disorder while a cut-off of 22 identified subclinical post-traumatic stress disorder. *Results*: 503 residents completed the questionnaire. Among residents who were directly involved in the clinical assistance of COVID-19 patients, 34.3% presented a probable diagnosis of post-traumatic stress disorder, while 21.5% presented subclinical post-traumatic stress disorder. Female gender and history of psychological trauma were significantly associated with the development of post-traumatic stress symptoms. *Conclusions*: Our data suggest a high incidence of post-traumatic stress disorder in Italian residents working in Intensive Care Units and Emergency Departments during the SARS-CoV-2 outbreak. This finding supports the importance of promptly implementing any strategy that might preserve staff mental health. (www.actabiomedica.it)

Keywords: post-traumatic stress disorder; residents; COVID-19; survey; intensive care; emergency department

Introduction

Since December 2019 a novel coronavirus (SARS-CoV-2) disease (COVID-19 was reported in Wuhan (China) and it has rapidly spread across the world, affecting more than 2.600.000 individuals and causing nearly 181.000 deaths in late April 2020 [1-2]. Italy was the first country outside Asia to deal with a dramatically large outbreak of SARS-CoV-2 and the national healthcare system faced a severe systemic crisis, including an insufficient number of physicians

and an imbalance between high healthcare demands and basic healthcare supplies [3]. As a matter, doctors suffered the stressful work conditions due to extraordinary workloads, excessive occupational stress, huge mortality among patients, and potential health risks.

Exposure to traumatic events results in acute stress responses that may deteriorate and lead to post-traumatic stress disorder (PTSD). Typical features include intrusive memories (such as flashbacks, nightmares, and intrusive images), detachment and avoidance of activities and situations that evoke the

trauma. Moreover, there is usually a state of auto-nomic hyperarousal with hypervigilance, insomnia and enhanced startle reaction, an extremely rapid psy-chophysiological response of the organism to a sud-den and unexpected stimulus [4]. PTSD affects not only victims of traumatic events, but can involve also health care providers who assist the victims: during daily work activities they witness sorrow and perceive threat and, even if emotionally trained, they usually present a higher prevalence of PTSD (10-17%) than the general population (6,8%) [5-8]. Among health care providers, well-recognized PTSD predisposing factors include high levels of exposure, assisting survi-vors, shortage of supplies and resources, and perceived personal threat [9-10]. Furthermore, lack of support in work setting and low degree of job security have been associated with PTSD [4]. There are contradic-tory findings whether training and longer job experi-ence are risk factors for PTSD [9, 11-12]. A recent study has shown that the prevalence rate of PTSD was significantly higher in emergency care workers trainees than in expert providers, probably due to ex-posure to a novel environment, inexperience in the field, and the added pressure of academic evaluation [13]. In Italy, residents played a key role during the SARS-CoV-2 outbreak: indeed, they were employed to make up for the lack of staff in the Emergency Departments and ICUs, secondary to the massive in-crease in demand.

The aim of our study was to assess PTSD symp-toms among residents treating patients at the forefront of the SARS-CoV-2 outbreak in Italy.

Methods

Our study involved Italian residents in Anesthe-sia and Intensive Care and in Emergency Medicine. Primary outcome of the study was the prevalence of PTSD among residents involved in the care of criti-cally ill COVID-19 patients. Secondary outcome of the study was to identify possible risk factors associ-ated with the development of PTSD.

We developed a short questionnaire to obtain data regarding sociodemographic and profession-al characteristics, history of psychological trauma, psychotherapy, use of psychiatric medications. Post-traumatic stress disorder symptoms were assessed by the Impact of Event Scale-Revised (IES-R), which is a self-report measure assessing subjective distress result-ing from a traumatic life event . A cut-off of 33 identi-fied a probable diagnosis of PTSD, while a cut off of 22 identified subclinical PTSD [14-15].

At the end of March 2020, the multiple-choice questionnaire was sent by email and Whatsapp via a link to an online question and answer surveys. The sur-vey was created with LimeSurvey, an open source pro-fessional software. The questionnaire was anonymous, and the collected answers were automatically tabulated in an Excel worksheet.

Statistical Analysis

Categorical variables were presented as numbers and percentages. Normally distributed continuous data were described as mean and standard deviation (SD) and non-normal distributed data were described as median and interquartile range (IQR). Compari-sons between groups were performed by using the Chi-square (or Fisher) test.

The association between sociodemographic and psychological characteristics of participants and the development of PTSD was evaluated using a multi-ple logistic regression analysis. Variables that showed to differ between groups demonstrating a p-value <0.1 were entered into the multivariable model. The strength of the associations was expressed as the odds ratio (OR) and 95% confidence interval (95%CI). P-values <0.05 were considered statistically significant.

All analyses were performed with R software, ver-sion 3.5.2.

Results

From 25th March to 3rd April, 2020, 1297 italian residents were invited to participate. Of these, 503 completed the questionnaire (38.8% response rate). Most of them (62%) were directly involved in the clin-ical assistance of COVID-19 patients. Characteristics of respondents are described in Table 1.

Table 1. Study population.

CHARACTERISTICS		N (%)
TOTAL		503(100)
GENDER	Male	217 (43.2)
AGE	<30 year-old	239 (47.5)
	30-35 year-old	235 (46.7)
	35-45 year-old	27 (5.4)
	45-55 year-old	0 (0.0)
	>55 year-old	2 (0.4)
RESIDENCY	Anesthesia and Intensive Care	485 (85.0)
	Emergency Medicine	75 (15.0)
YEAR OF RESIDENCY	1st	113 (22.6)
	2nd	117 (15.8)
	3rd	79 (15.8)
	4th	90 (18.0)
	5th	101 (20.2)
LIVING WITH	Colleagues or friends	78 (15.5)
	Parents	45 (8.9)
	Partner, with children	33 (6.6)
	Partner, without children	192 (38.2)
	Alone, but with partner	79 (15.7)
	Alone and single	76 (15.1)
FAMILY LIVING IN A DIFFERENT REGION		206 (41.0)
MEETING FAMILY < ONCE EVERY 2 MONTHS		116 (56.3)
HISTORY OF PSYCHOLOGICAL TRAUMA		142(28.2)
PREVIOUS PSYCHOTHERAPY		109 (21.7)
CURRENT PSYCHOTHERAPY		27(24.8)
PREVIOUS PSYCHIATRIC MEDICATIONS	Total	50 (9.9)
	Benzodiazepines	39 (78.0)
	Antidepressants	30 (60.0)
	Antipsychotics	5 (10.0)
	Other psychoactive drugs	4 (8.0)
CURRENT PSYCHIATRIC MEDICATIONS		18 (36.0)
CARING FOR COVID-19 PATIENTS	Total	312 (62.0)
	Emergency Department	71 (22.8)
	Operating Room	44 (14.1)
	Intensive Care Unit	224(73.1)

Among residents who were directly involved in the clinical assistance of COVID-19 patients, 174 (55.8%) presented symptoms of traumatic stress disorders. In particular, 107 (34.3%) presented a probable diagnosis of PTSD, while 67 (21.5%) presented subclinical PTSD.

Characteristics of residents who presented a probable diagnosis of PTSD are described in Table 2.

Main symptoms of PTSD were intrusion and hyperarousal (median IES-R score 2.57 [2.14, 3.00] and 2.00 [1.57, 2.29], respectively). Relationship between intrusion, avoidance, hyperarousal and IES-R score is presented in Figure 1.

At univariate logistic regression analysis, the factors that demonstrated to be significantly associated with the presence of a probable diagnosis of PTSD were female gender and history of psychological trauma (OR=0.37, 95% CI 0.22-0.62 and OR=2.41 ,95% CI 1.45-4.01, respectively). Results were confirmed at the multivariable logistic regression model (Table 3).
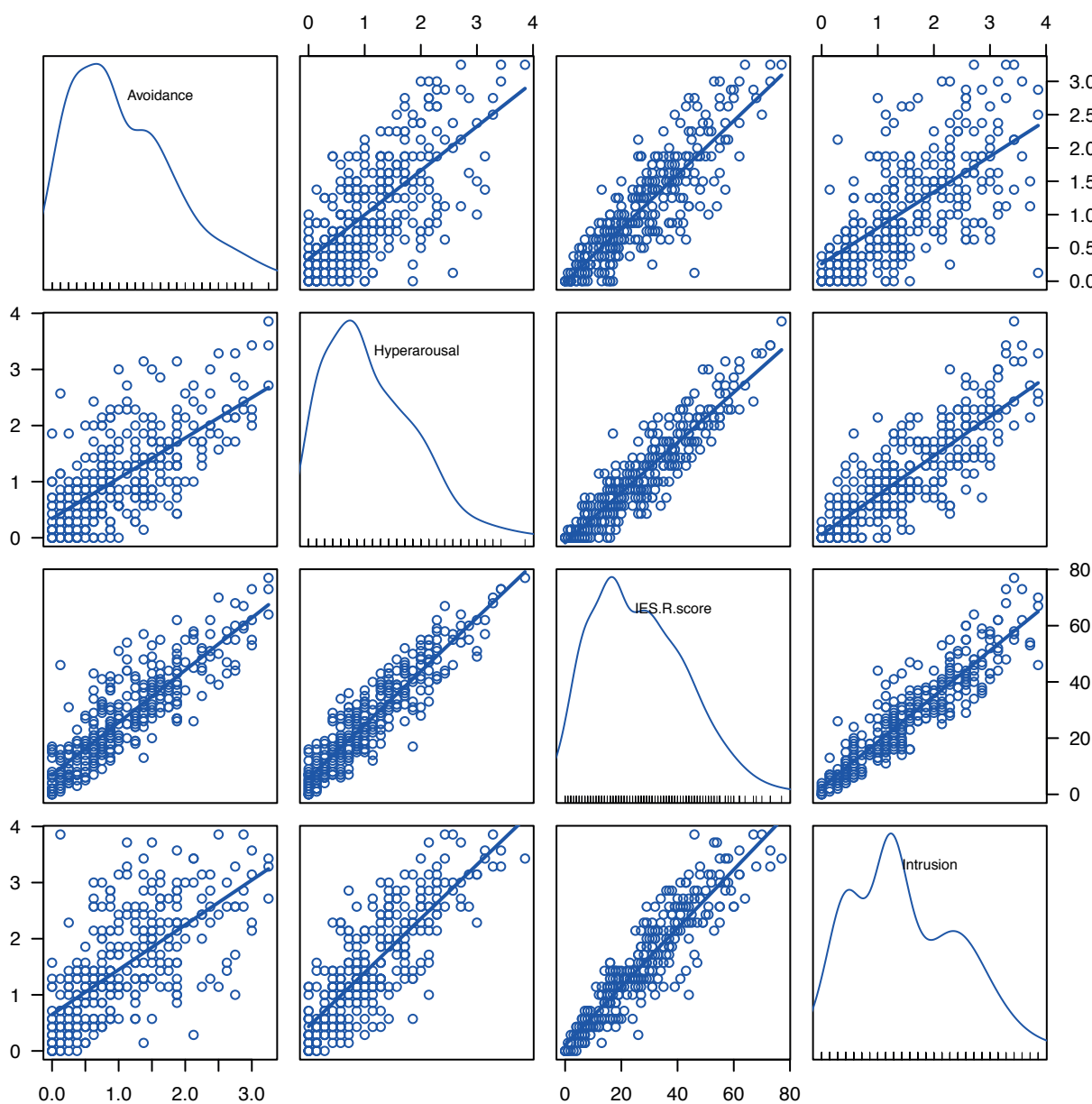
Table 2. PTSD population.

Characteristics		Probable diagnosis of PTSD N (%)
TOTAL		107 (100)
GENDER	Male	29 (27.1)
AGE	<30 year-old	41(38.3)
	30-35 year-old	60 (56.0)
	35-45 year-old	6 (5.7)
	45-55 year-old	0 (0.0)
	>55 year-old	0(0.0)
RESIDENCY	Anesthesia and Intensive Care	71 (66.4)
	Emergency Medicine	24 (22.6)
YEAR OF RESIDENCY	1st	12 (11.4)
	2nd	21 (20.0)
	3rd	21 (20.0)
	4th	24 (22.9)
	5th	27 (25.7)
LIVING WITH	Colleagues or friends	17 (15.9)
	Parents	7 (6.5)
	Partner, with children	6 (5.6)
	Partner, without children	47 (43.9)
	Alone, but with partner	19 (17.8)
	Alone and single	11 (10.3)
FAMILY LIVING IN A DIFFERENT REGION		42 (39.3)
MEETING FAMILY < ONCE EVERY 2 MONTHS		22(52.4)
HISTORY OF PSYCHOLOGICAL TRAUMA		48 (44.9)
PREVIOUS PSYCHOTHERAPY		42 (20.5)
CURRENT PSYCHOTHERAPY		8 (22.2)
PREVIOUS PSYCHIATRIC MEDICATIONS	Total	16 (15.0)
	Benzodiazepines	12 (75.0)
	Antidepressants	12 (75.0)
	Antipsychotics	0 (0.0)
	Other psychoactive drugs	2 (12.5)
CURRENT PSYCHIATRIC MEDICATIONS		4(25.0)
CARING FOR COVID-19 PATIENTS	Emergency Department	34 (31.8)
	Operating Room	12 (11.2)
	Intensive Care Unit	78 (72.9)

The same factors resulted to be significantly associated with the presence of subclinical PTSD (Supplemental Table 1).

Discussion

This is, to our knowledge, the first study evaluating psychological stress among residents involved in SARS-CoV-2 patients' care. The incidence of PTSD symptoms is high, especially in female residents and in trainees who reported psychological and/or emotional trauma in the past.

Previous studies, conducted during SARS outbreak in 2003, proved that an extraordinary infectious outbreak can cause enduring stress in healthcare personnel: more than 50% of healthcare workers who were in high-risk situations reported significant distress symptoms, which included feeling of uncertainty and stigmatization, reluctance to work, resignation, anxiety, and depression [16-21].

Our survey reported a 34% incidence of probable PTSD among residents caring for COVID-19 patients, while 21.5% of the responders presented subclinical PTSD. We compared our results with the study of Lai and collaborators, from January 29, 2020 to February 3, 2020 in China: IES-R scores were interpreted with different cutoffs, however, 42% of physicians and nurses working in the frontline scored above 25. They also found IES-R scores significantly higher in women than in men.[22] The psychological response of healthcare personnel to a viral epidemic may be affected by several sources of distress. Working in the frontline directly caring for COVID-19 patients has been demonstrated to be an independent risk factor for PTSD [22]. The human-to-human transmission, associated with the high morbidity and the potentially fatal outcome, increases the perception of vulnerability and personal danger. The large number of cases with poor short-term positive results due to lack of specific drugs, the overwhelming workload and the depletion of personal protection equipment intensify the concerns about personal health and contribute to the feeling of losing control [23].

Unlike stress due to other disasters, stress related to an infectious disease involves healthcare providers not only personally, but also in relationship to their family and usual social environment. Indeed, while family support usually buffers stress, during infectious outbreak healthcare workers additionally fear the risk of infecting loved ones [23]. In 2003, a study among frontline hospital personnel in Toronto during the SARS epidemic showed that healthcare providers with children experienced higher levels of distress [24]. Furthermore, social isolation largely contributes to distress onset. Infection containment measures, such as quarantine, might increase interpersonal distance and diminish community interaction [25-26]. Nonetheless we did not find any association between respondents' family structure and development of PTSD.

The association between previous psychological trauma and PTSD symptoms is consistent with previous studies showing a greater risk of developing PTSD in people with previous exposure to trauma. [27] Interestingly, previous and current psychotherapy and previous and current use of psychiatric medications are not associated with distress symptoms related to the outbreak. Previous studies showed an increased risk of PTSD in people with a history of mental disorders. [28] The most likely reason for this contrasting findings is that mental health treatments could buffer this risk. Indeed, Kang and collaborators found that mental health services had an important role, mediating (partially) the relationship between exposure risks and mental health and regulating the relationship between the risk of exposure and subjective physical health perceptions by affecting mental health[21].

We acknowledge that our study presents some limitations. First, it's not a prospective cohort nor a cross-sectional study, it only involves Intensive Care and Emergency Medicine residents on the front line of COVID-19 pandemic. We made this decision in order to get the most homogenous sample. Indeed, previous studies proved that the impacts of infectious agents on the psychological health of hospital personnel were strictly related to department and occupation, with the level of distress increasing in line with the extent of exposure [22, 29, 30]. Second, compared with face-to-face interviews, self-reporting online surveys have limitations. Third, since the response rate of our study is 38.8%, a response bias might exist, if those who did not answer were either too stressed to respond or not

stressed at all and therefore not interested in this survey.

Conclusions

Our data suggest a high incidence of PTSD symptoms in Italian residents who work in the Intensive Care Unit and Emergency Department facing COVID-19 emergency. Therefore, maintaining staff mental health is essential and comprehensive measures should be promptly adopted to recognize and protect the psychological health needs of medical staff during sudden crisis scenarios.

Conflict of interest

Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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Appendix

Supplemental Table 1. Logistic regression analysis on the association between development of PTSD symptoms (even sub-threshold) and residents' sociodemographic and psychological characteristics.

CHARACTERISTICS OR of development of PTSD symptoms *(95% CI)*		UNIVARIATE ANALYSIS		MULTIVARIATE ANALYSIS	
		p-value	OR of development of PTSD symptoms *(95% CI)*	*p-value*	
GENDER	Male	0.29 (0.17-0.47)	**<0.001**	0.30 (0.19-0.49)	**<0.001**
AGE	<30 year-old	1.24 (0.39-3.95)	0.72		
	30-35 year-old	2.16 (0.69-6.75)	0.18		
LIVING WITH	Colleagues or friends	0.96 (0.40-2.34)	0.94		
	Parents	1.30 (0.41-4.13)	0.66		
	Partner, with children	0.56 (0.16-1.99)	0.37		
	Partner, without children	1.66 (0.78-3.52)	0.19		
	Alone, but with partner	1.40 (0.56-3.50)	0.47		
	Alone and single	1.38 (0.66-3.61)	0.48		
FAMILY LIVING IN A DIFFERENT REGION		0.77 (0.46-1.31)	0.33		
HISTORY OF PSYCHOLOGICAL TRAUMA		2.36 (1.31-4.27)	**0.004**	2.20 (1.30-3.72)	**0.003**
PREVIOUS PSYCHOTHERAPY		0.63 (0.32-1.27)	0.20		
PREVIOUS PSYCHOACTIVE DRUGS		1.97 (0.74-5.24)	0.17		