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Mental health and risk perception among Italian healthcare workers during the second month of the Covid-19 pandemic

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ABSTRACT

A multicentre cross-sectional study was conducted to assess perceived risk and fear of contagion, as well as mental health outcomes among 650 Italian healthcare workers during the COVID-19 outbreak. A relevant proportion of the sample reported symptoms of anxiety, depression, and distress. Female sex, nursing profession, fear of being infected, as well as the time of exposure to the COVID-19 spread and the fact of directly attending infected patients were the main risk factors for developing mental health disturbances. Tailored interventions need to be implemented to reduce psychological burden in healthcare workers, with a particular attention to nurses.

Introduction

COVID-19 spread is actually causing an unprecedented psychological stress on people worldwide, and in particular on the nursing and medical workforce, committed to the front line to face one of the most serious disaster of the history in terms of hospitalizations and deaths. In such a dramatic condition, healthcare providers are facing a high risk of contracting the disease, with a growing number of them who already died for it (Hassanian-Moghaddam et al., 2020), as well as an increased risk of developing mental health symptoms such as anxiety, depression, insomnia, work-related stress and post-traumatic stress disorder (Lai et al., 2020).

Despite the fact that COVID-19 spread has started quite recently, there are already some published studies investigating its impact on mental health of healthcare workers in China, India and Malesia, where the pandemic spread originated. Mainly, these results show that physicians, nurses and other staff started manifesting moderate to severe psychological disturbances (Chew et al., 2020; Zhu et al., 2020) already in the immediate wake of the viral epidemic (Kang et al., 2020). Such

emotional distress is mainly associated to risk perception, countless death, perceived uncontrollability of the hazard, long work shifts, and working directly with Covid-19 patients. Moreover, also some socio-demographic and working-related factors such as being female (Wu et al., 2009; Chen et al., 2005; Styra et al., 2008; Lu et al., 2020; Zhu et al., 2020), having a longer job seniority (Li et al., 2020; Zhu et al., 2020) and being non-medical healthcare providers (Tan et al., 2020) appear to significantly contribute to the workers' emotional burden. Since there is also a large literature demonstrating the dramatic psychological impact of previous epidemics (i.e. SARS outbreak) (Brooks et al., 2020), further studies are needed to explore factors associated with mental health among health care workers exposed to COVID-2019 in order to develop timely psychological interventions to reduce them (Neto et al., 2020).

Regarding Italy, it has been the first European nation to be affected by COVID-19 with, at the time of this writing, 223,885 cases reported and 31,610 associated fatalities, largely exceeding the numbers in China (WHO, 2020). However, to our knowledge, there is actually only one published study that analyzed the effects of COVID-19 spread on the

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Italian healthcare providers (Rossi et al., 2020) showing that a substantial proportion of them, and young women in particular, developed mental health issues, including post-traumatic stress disorder (PTSD). In order to further investigate this issue, the aim of this study was to conduct a multicentre cross-sectional in-hospital assessment to evaluate mental health outcomes among different categories of Italian healthcare workers during the second month of the COVID-19 outbreak. Specifically, we explored: a) the workers' perceived risk and fear related to COVID-19 contagion for themselves and their family members, b) the magnitude of symptoms of anxiety, depression, and distress emerged, and c) the potential risk factors associated with mental health symptoms.

Method

Participants

During the COVID-19 outbreak, healthcare professionals from two Italian hospitals (Istituti Clinici Scientifici Maugeri, IRCCS [Maugeri] and Centro Cardiologico Monzino, IRCCS [CCM]) were invited to participate to an online cross-sectional survey conducted using the Qualtrics® platform from April 1st to May 1st 2020. Both these hospitals are located in Lombardy, the Italian region registering the highest number of COVID-19 cases of the entire country (Percudani et al., 2020), and underwent a major reorganization with several units admitting almost exclusively COVID-19 patients.

The present study was approved by the local Scientific Ethics Committee (Maugeri approval number 2411, 26 March 2020; CCM approval number 1238, 17 April 2020) and all participants provided the informed consent to participate. The survey was anonymous, and confidentiality of information was assured. Once started to fill in the survey, subjects could quit it at any time without any consequence.

Instruments

The survey, specifically developed for this study, included the following different domains: (a) socio-demographics (e.g., age, sex, marital status, number of children, presence of elderly parents); (b) work-related information (e.g., place of work, occupation, job seniority, directly attending COVID patients); and (c) the perceived impact of COVID-19 on workplace and on individual working activities (e.g., confidence in Personal Protection Equipment [PPE] measures, and sources of COVID-19 work-related stress). These domains were chosen on the basis of the available literature and on the shared opinions of experts working and caring for COVID-19 patients. Furthermore, participants were asked to answer questions about their own physical (e.g. COVID-19 positivity) and mental health status. In particular, the following psychological domains were investigated:

- *Perceived risk and fear of infection related to COVID-19*: these two aspects were assessed using four items asking participants to quantify, on a 0–100 slider scale, a) their personal perceived risk of being infected; b) the perceived risk that their family members could be infected; c) their fear of being infected; and d) their fear about the possibility that their family members could be infected.
- *Mental health status*: the general mental health status was assessed using the PHQ-4 questionnaire (Patient Health Questionnaire - 4) (Kroenke et al., 2009) that is a validated ultra-brief tool for detecting both anxiety and depressive symptoms. The PHQ-4 consists of the first two items of the Generalized Anxiety Disorder scale (GAD-7) (Spitzer et al., 2006) and the first two items of the longer Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001). Responses are provided on a Likert scale ranging from 0 (=“not at all”) to 3 (=“nearly every day”). A total score ≥ 6 for the PHQ-4, or ≥ 3 for the two subscales indicates the presence of mild symptoms, while a total score ≥ 9 for the PHQ-4, or ≥ 5 for the two subscales indicates the

presence of severe symptoms (Löwe et al., 2010). Because of its excellent operating characteristics (Kroenke et al., 2009), the PHQ-4 may well substitute for its parent scales (the GAD-7 and PHQ-9), being very useful to assess depression and anxiety in busy clinical and non-clinical settings and conditions, such as the COVID-19 emergency, in which healthcare providers had very few times to complete questionnaires.

- *Psychological distress*: psychological distress induced by the COVID-19 outbreak was assessed using the Impact of Event Scale-Revised (IES-R) (Creamer et al., 2003) which is a validated 22-item self-report that measures the subjective distress caused by traumatic events. It includes 3 subscales measuring the following dimensions: intrusion, avoidance and hyperarousal. Participants were asked to rate their level of distress using a 5-point Likert scale ranging from 0 (=“not at all”) to 4 (=“often”) referring to the previous seven days. A total score ranging from 0 to 23 indicates the absence of relevant symptoms, from 24 to 32 the presence of mild symptoms, from 33 to 36 the presence of moderate symptoms, and >37 the presence of a severe psychological impact (Creamer et al., 2003; Weiss, 2007).

Statistical analyses

Categorical variables are expressed as absolute values (percentage) while continuous variables are expressed as mean \pm standard deviation. Comparisons between healthcare professionals or sex were performed using ANOVA test for continuous variables, while categorical variables were compared using the Chi-square test. To assess difference between the perceived risk or fear of contagion between the respondents and their families, paired *t*-tests were performed. In order to evaluate the factors independently associated with the different scores obtained from the psychological questionnaires and the related subclasses, multivariable linear regressions with stepwise selection of variables was implemented including all the potential predictors (see Table 1 and Fig. 1). The independent contribution of each predictor to the variability of the dependent variables was quantified by the squared partial correlation coefficient.

The significance level was $p < .05$ (two-tailed) except for the multivariable analysis, where a more conservative $p < .01$ was chosen, in order to account for multiple testing. All the analyses were performed using SAS version 9.4 (SAS Institute Inc., Cary, NC, US).

Results

Participants' characteristics

In this cross-sectional survey, we retrieved a total of 770 questionnaires. Of which, 73 questionnaires were excluded for the irrational completion time, and 47 incomplete questionnaires were also eliminated. The remaining 650 questionnaires were completed eligibly, giving an overall response rate of 84.4%.

The respondents included 177 physicians, 214 nurses, 217 other healthcare professionals (psychologists, physiotherapists, dieticians, and speech therapists), and 42 administrative staff (including the logistics). The detailed demographic characteristics are presented in Table 1. The largest proportion of female respondents was found in the nurses group (80.4%), while the physicians were those with the highest age (mean = 48.75 \pm 10.4 years). Almost half of all workers had a job seniority longer than 20 years (49.4%).

Regarding data related to the COVID-19 emergency, at the time of assessment 60.8% of all responders were working in units with COVID patients. Half of responders (51.7%) were tested for COVID-19 and were negative. Most of those tested were physicians (60.5%). Among those never tested, 20.3% were worried to be positive.

Many physicians (50.3%) and nurses (65.4%) declared that the COVID-19 emergency had a high impact on their everyday working activities. Among them, 29.9% of nurses and only 14.7% of physicians

Table 1
Characteristics of study participants (N = 650).

	Total (n = 650)	Physicians (n = 177)	Nurses (n = 214)	Other healthcare professionals (n = 217)	Administrative staff (n = 42)	p
<i>Sociodemographic variables</i>						
Age	44.59 ± 11.1	48.75 ± 10.4	42.82 ± 10.6	43.12 ± 11.3	43.43 ± 10.7	<.001
Sex - Female	439 (67.5%)	100 (56.5%)	172 (80.4%)	140 (64.5%)	27 (64.3%)	<.001
<i>Marital status</i>						
Single	93 (14.3%)	15 (8.5%)	32 (15%)	38 (17.5%)	8 (19%)	.031
In a relationship	146 (22.5%)	35 (19.8%)	58 (27.1%)	46 (21.2%)	7 (16.7%)	
Engaged or married	335 (51.5%)	110 (62.1%)	95 (44.4%)	112 (51.6%)	18 (42.9%)	
Divorced or separated	58 (8.9%)	14 (7.9%)	20 (9.3%)	16 (7.4%)	8 (19%)	
Widower	5 (0.8%)	2 (1.1%)	2 (0.9%)	1 (0.5%)	0 (0%)	
Other	13 (2%)	1 (0.6%)	7 (3.3%)	4 (1.8%)	1 (2.4%)	
Children - Yes	380 (58.5%)	118 (66.7%)	118 (55.1%)	124 (57.1%)	20 (47.6%)	.045
Parents > 65 years - Yes	440 (67.7%)	128 (72.3%)	148 (69.2%)	135 (62.2%)	29 (69%)	
<i>Working-related variables</i>						
Work place - Maugeri	453 (69.7%)	126 (71.2%)	145 (67.8%)	171 (78.8%)	11 (26.2%)	<.001
Work place - CCM	197 (29.2%)	51 (28.8%)	69 (32.2%)	46 (21.2%)	31 (73.8%)	
<i>Job seniority</i>						
>20 years	321 (49.4%)	91 (51.4%)	110 (51.4%)	99 (45.69%)	21 (50%)	.139
<20 and >10 years	160 (24.6%)	53 (29.9%)	45 (21%)	52 (24%)	10 (23.8%)	
<10 years	169 (26%)	33 (18.6%)	59 (27.6%)	66 (30.4%)	11 (26.2%)	
<i>COVID-19-related variables</i>						
Directly attending COVID patients Yes	395 (60.8%)	115 (65%)	136 (63.6%)	123 (56.7%)	21 (50%)	.135
<i>Workers positive to COVID-19</i>						
Never tested	288 (44.3%)	62 (35%)	88 (41.1%)	107 (49.4%)	31 (73.8%)	<.001
Tested, but negative	336 (51.7%)	107 (60.5%)	115 (53.7%)	104 (47.9%)	10 (23.8%)	
Yes, in the past	21 (3.2%)	5 (2.8%)	11 (5.1%)	4 (1.8%)	1 (2.4%)	
Yes, actually	5 (0.8%)	3 (1.7%)	0 (0%)	2 (0.9%)	0 (0%)	
<i>Impact of COVID-19 on working activities</i>						
Not at all	37 (5.7%)	9 (5.1%)	7 (3.3%)	16 (7.4%)	5 (11.9%)	
A little bit	118 (18.2%)	35 (19.8%)	28 (13.1%)	47 (21.7%)	8 (19%)	
Moderately	156 (24%)	44 (24.9%)	39 (18.2%)	65 (30%)	8 (19%)	
A lot	200 (30.8%)	63 (35.6%)	76 (35.5%)	51 (23.59%)	10 (23.8%)	
Absolutely yes	139 (21.4%)	26 (14.7%)	64 (29.9%)	38 (17.5%)	11 (26.2%)	
<i>From how long</i>						
<1 week	5 (0.8%)	1 (0.6%)	2 (0.9%)	2 (0.9%)	0 (0%)	.575
>1 and <2 weeks	14 (2.2%)	3 (1.7%)	3 (1.4%)	8 (3.7%)	0 (0%)	
>2 and <3 weeks	41 (6.3%)	11 (6.2%)	18 (8.4%)	11 (5.1%)	1 (2.4%)	
>3 weeks	590 (90.7%)	162 (91.5%)	191 (89.3%)	196 (90.3%)	41 (97.6%)	
<i>Availability of PPE</i>						
Not at all	35 (5.4%)	7 (4.0%)	13 (6.1%)	13 (6.0%)	2 (4.8%)	.601
A little bit	189 (29.1%)	50 (28.2%)	56 (26.2%)	66 (30.4%)	17 (40.5%)	
Enough	274 (42.2%)	76 (42.9%)	95 (44.4%)	92 (42.4%)	11 (26.2%)	
A lot	131 (20.2%)	35 (19.8%)	44 (20.6%)	41 (18.9%)	11 (26.2%)	
Absolutely yes	21 (3.2%)	9 (5.1%)	6 (2.8%)	5 (2.3%)	1 (2.4%)	
Work shift during COVID-19 emergency - Yes	319 (49.1%)	92 (28.8%)	164 (76.6%)	54 (24.9%)	9 (21.4%)	<.001

affirmed that the impact was extremely high. For the 90.7% of all responders the COVID-19 impact was present from more than 3 weeks.

We also asked responders to evaluate the availability of PPE in their working places, finding that 34.5% of them declared that available PPE were not enough.

Measures adopted to protect family members and perceived risk and worries about contagion

Starting from the beginning of the COVID-19 spread, 9.3% of responders who used to live with their relatives decided to move in a separate apartment, 9.0% isolated themselves from their relatives when came back home, and 36.9% started to use PPE at home in order to protect people living with them. The remaining responders decided to not use any kind of precautions at home because they did not have the possibility to do it (for example, the apartment was too small to stay separate from their relatives) (17.6%) or because they thought it was not necessary (13.3%).

In general, healthcare workers thought they were more at risk ($M = 62.87$, $SD = 24.20$) than their family members who lived with them ($M = 58.22$, $SD = 27.90$) to contract the virus ($t(428) = 2.34$, $p = .02$). On

the contrary, they were more worried about possible contagion for their family members ($M = 69.76$, $SD = 28.91$) than for themselves ($M = 66.33$, $SD = 29.18$) ($t(443) = -2.87$, $p = .004$). Significant differences were also found among different categories of healthcare providers both in the perceived risk and in the fear of contagion for themselves and for their family members. Regarding the perceived risk of being infected, there was a statistically significant difference between groups of healthcare providers as determined by one-way ANOVA ($F(3,561) = 4.104$, $p = .007$). In particular, a Tukey post hoc test revealed that nurses ($M = 67.73 \pm 24.20$) felt themselves more at risk of contracting the virus than physicians ($M = 60.25 \pm 25.55$) ($p = .02$) and other healthcare workers ($M = 60.57 \pm 22.06$) ($p = .02$). On the contrary, no statistically significant differences were found among the different groups regarding the perceived risk that family members could be infected ($p = .06$).

Regarding the fear of being infected, different groups did not show any significant difference ($F(3,572) = 2.739$, $p = .06$). On the contrary, nurses ($M = 67.07 \pm 29.54$) ($p = .02$) and administrative staff ($M = 69.19 \pm 28.78$) ($p = .04$) were more worried than physicians ($M = 58.99 \pm 29.76$) about the possibility that their family members could become infected ($F(3,474) = 4.325$, $p = .005$) (see Fig. 1).

No significant differences were found between the different

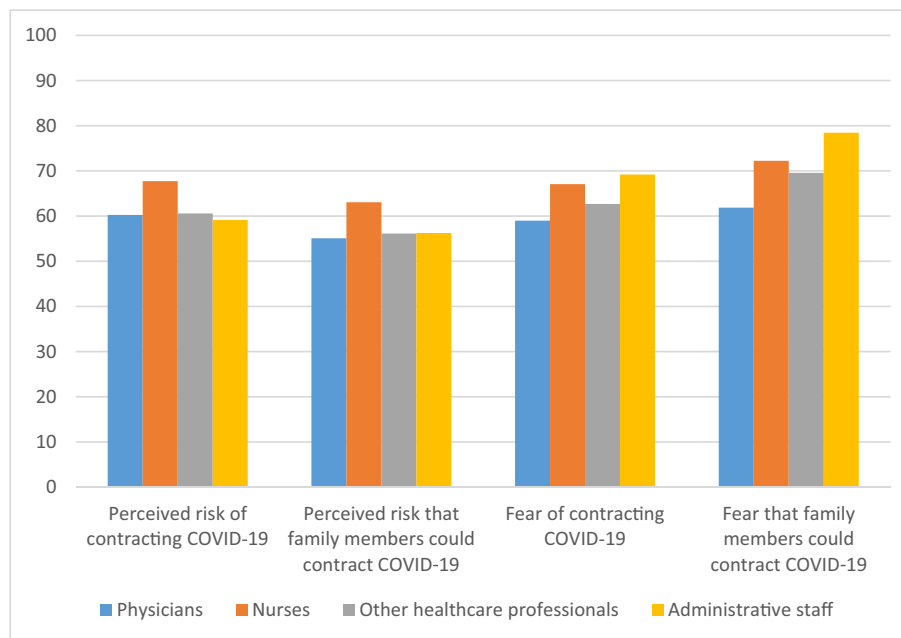


Fig. 1. Perceived risk and fear for themselves and for family members about COVID-19 contagion among the different categories of healthcare workers.

categories of healthcare workers and the precautions adopted at home ($\chi^2 (15, N = 547) = 19.724, p = .183$).

Table 1). The main reasons why this happened are reported in Fig. 2.

Perceived effects of COVID-19 on the working routine

As described above, most of responders declared that the COVID-19 spread had a significant impact on their everyday workload (see

Psychological outcomes

Data obtained from psychological questionnaires showed that, in general, women presented higher scores than men, while physicians presented lower scores than the other workers in all the investigated

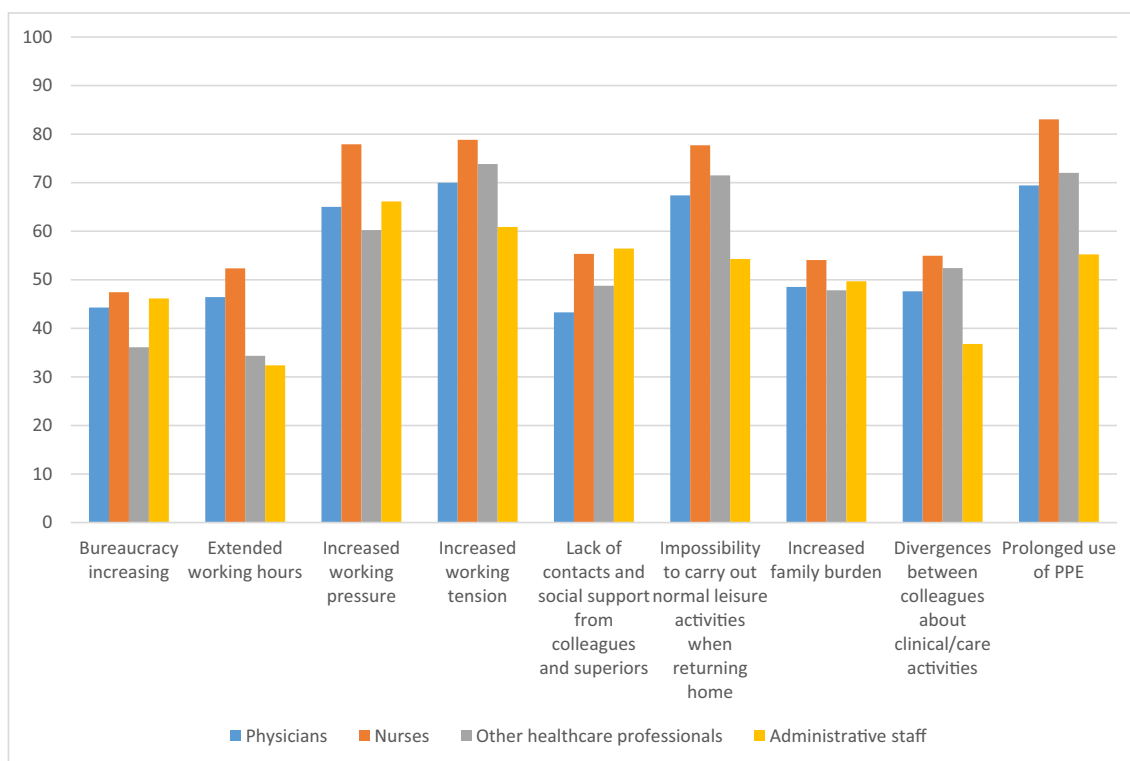


Fig. 2. Main reasons that, according to the different categories of workers, were responsible of the impact of COVID-19 on the daily working activity. Note that the variable named “Working pressure” refers to the increased number of work-related requests occurred during the COVID-19 emergency, while the variable “Working tension” regards the increased tension in the working climate.

domains (see Table 2).

Risk factors on mental health outcomes

A series of multivariable regression analyses, including all the variables presented in Table 1 and Fig. 1 were conducted in order to predict which factors better explain the incidence of psychological disorders in the healthcare staff. In the tables only the variables of the stepwise selection model were reported (see Fig. 3).

Anxiety and depression

The regression analysis showed that male health care professionals experienced significantly less severe anxiety symptoms than their female colleagues ($\beta = -0.25$; $p < .0001$). The number of weeks COVID-19 has been impacting on health care professionals work positively associated with anxiety symptoms ($\beta = 0.20$; $p = .0012$). Furthermore, also the fear of contracting COVID-19 increased the severity of anxiety symptoms ($\beta = 0.01$; $p < .0001$). Finally, healthcare professionals' anxiety symptoms positively associated with their perceived probability of being the source of contagion for those who lived with them ($\beta = 0.004$; $p = .0018$) (see Table 3).

Similarly, men experienced significantly less severe depressive symptoms than their female colleagues ($\beta = -0.45$; $p < .0001$) and, in general, health care professionals depressive symptoms positively associated with the fear of contracting COVID-19 ($\beta = 0.02$; $p = .0006$) (see Table 4).

Table 2
Comparison of the prevalence of anxiety, depression and distress among the different categories of healthcare workers, and between males and females.

	N tot (%)	Physicians (n = 177)	Nurses (n = 214)	Other healthcare professionals (n = 217)	Administrative staff (n = 42)	X ²	p value	Males	Females	X ²	p value
PHQ-4						11.287	.080			20.583	<.001
<6	496 (76.3)	143 (80.8)	151 (70.6)	171 (78.8)	31 (73.8)			184 (87.2)	312 (71.1)		
No symptoms											
≥6	87 (13.4)	25 (14.1)	33 (15.4)	23 (10.6)	5 (11.9)			16 (7.6)	71 (16.2)		
Mild symptoms											
≥9	67 (10.3)	9 (5.1)	30 (14.0)	23 (10.6)	5 (11.9)			11 (5.2)	56 (12.8)		
Severe symptoms											
GAD-2 Anxiety						13.821	.032			18.109	<.001
<3	457 (70.3)	137 (77.4)	136 (63.6)	157 (72.4)	27 (64.3)			171 (81)	286 (65.1)		
No symptoms											
≥3	116 (17.8)	27 (15.3)	50 (23.4)	30 (13.8)	9 (21.4)			27 (12.8)	89 (20.3)		
Mild symptoms											
≥5	77 (11.8)	13 (7.3)	28 (13.1)	30 (13.8)	9 (21.4)			13 (6.2)	64 (14.6)		
Severe symptoms											
PHQ-2 Depression						1.602	.024			17.670	<.001
<3	502 (77.2)	144 (81.4)	148 (69.2)	178 (82.0)	32 (76.2)			184 (87.2)	318 (72.4)		
No symptoms											
≥3	104 (16.0)	26 (14.7)	43 (20.1)	28 (12.9)	7 (16.7)			19 (9.0)	85 (19.4)		
Mild symptoms											
≥5	44 (6.8)	7 (4.0)	23 (10.7)	11 (5.1)	3 (7.1)			8 (3.8)	36 (8.2)		
Severe symptoms											
IES-R										23.333	<.001
0–23	356 (55.1)	120 (67.8)	87 (41.0)	127 (59.1)	22 (52.4)			144 (68.6)	212 (48.6)		
No symptoms											
24–32	104 (16.1)	21 (11.9)	43 (20.3)	31 (14.4)	9 (21.4)			22 (10.5)	82 (18.8)		
Mild symptoms											
33–36	36 (5.6)	9 (5.1)	13 (6.1)	10 (4.7)	4 (9.5)			10 (4.8)	26 (6.0)		
Moderate symptoms											
>37	150 (23.2)	27 (15.3)	69 (32.5)	47 (21.9)	7 (16.7)			34 (22.7)	116 (26.6)		
Severe symptoms											

Psychological distress

The regression analysis showed that male health care professionals seemed to have less suffered the pandemic impact than their female colleagues ($\beta = -0.45$; $p = .0008$). Furthermore, it seemed that nurses have suffered the impact of the pandemic more than both physicians ($\beta = -0.66$; $p \leq .0001$) and other health professionals ($\beta = -0.52$; $p = .0007$) (see Table 5).

Tables 5a, 5b and 5c show results obtained from the IES-R subscales (Avoidance, Intrusion, Hyperarousal).

Discussion

The present multicentre cross-sectional study was conducted in Italy during the second month of the COVID-19 pandemic. Chronologically, Italy has been the second nation, after China, seriously affected by the COVID-19 emergency that has required rapid changes in the entire healthcare system and an extraordinary workload for all the healthcare professionals. The sudden and violent spread of the virus has also induced a serious emotional load mainly due to the fear of contagion and the high number of victims occurred in a very short time. In such a critical condition, we investigated the workers' perception about the Covid-19 related-risks, the magnitude of symptoms of anxiety, depression and distress emerged, and the potential risk factors associated with mental health symptoms.

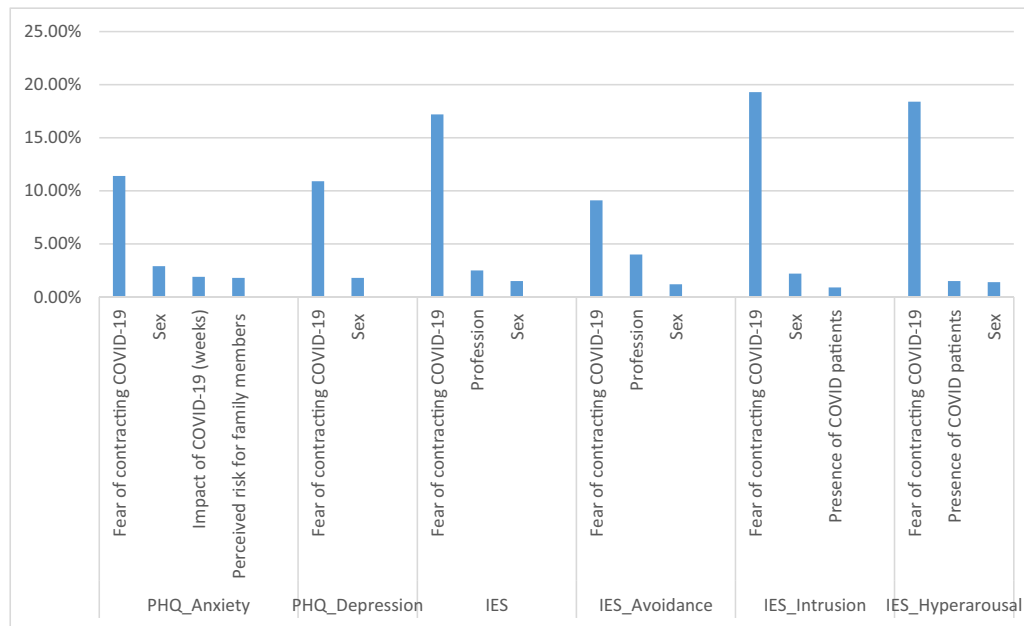


Fig. 3. Partial R square (%) indicating the sources of variability for the different psychological variables.

Table 3
GLM for anxiety symptoms.

GAD-2	β	SE	t	Pr > t
Sex (man)	-0.25	0.06	-4.05	<0.0001
How likely do you think the people who live with you will contract Covid-19?	0.004	0.001	3.15	0.0018
How many weeks has the Covid-19 emergency impacted on your daily workload?	0.20	0.06	3.26	0.0012
How much are you frightened by the possibility of contracting the Covid-19?	0.01	0.00	7.99	<0.0001

Table 4
GLM for depressive symptoms.

PHQ-2	β	SE	t	Pr > t
Sex (man)	-0.45	0.13	-3.45	0.0006
How much are you frightened by the possibility of contracting the Covid-19?	0.02	0.00	8.54	<0.0001

Table 5
GLM for psychological distress. Job reference category Nurses.

	β	SE	t	Pr > t
Sex (man)	-0.45	0.13	-3.38	0.0008
How much are you frightened by the possibility of contracting the Covid-19?	0.03	0.00	11.47	<0.0001
Job (physicians)	-0.66	0.16	-4.06	<0.0001
Job (other health care professionals)	-0.52	0.15	-3.42	0.0007
Job (technical and administrative staff)	-0.48	0.27	-1.79	0.0738

Perceived risk and fear of infection for themselves and family members

Regarding the perceived risk of being infected, healthcare workers thought they were more at risk than their family members to contract the virus. This was expected, considering that they spent their working time in a hospital, while their relatives did not. Opposite results came from data about the fear of contagion, showing that they were more worried for their family members than for themselves. These results are

Table 5a
GLM for subscales of psychological distress: Avoidance. Job reference category Nurses.

	β	SE	t	Pr > t
Sex (man)	-0.09	0.03	-2.84	0.0047
How much are you frightened by the possibility of contracting the Covid-19?	0.004	0.001	7.96	<0.0001
Job (physicians)	-0.209	0.04	-5.14	<0.0001
Job (other health care professionals)	-0.133	0.04	-3.53	0.0005
Job (technical and administrative staff)	-0.128	0.067	-1.92	0.0549

Table 5b
GLM for subscales of psychological distress: Intrusion.

	β	SE	t	Pr > t
Sex (man)	-0.136	0.03	-4.12	<0.0001
How much are you frightened by the possibility of contracting the Covid-19?	0.006	0.001	12.08	<0.0001
Directly attending COVID patients (no)	-0.084	0.03	-2.65	0.0083

Table 5c
GLM for subscales of Psychological Distress: Hyperarousal.

	β	SE	t	Pr > t
Sex (man)	-0.114	0.03	-3.27	0.0011
How much are you frightened by the possibility of contracting the Covid-19?	0.007	0.00	11.66	<0.0001
Directly attending COVID patients (no)	-0.112	0.03	-3.35	0.0008

in line with those reported by Dai et al. (n.d.) who found that, in the early stage of COVID-19 epidemic, healthcare workers were worried about getting infected (40%), but were even more worried about the risk to infect colleagues (72.5%) and family members (63.9%). It is possible that healthcare workers act a sort of defensive strategy that leads to shifting their own fears into the most intimate people, which thus be controlled and kept away through altruistic and protective behaviours (such as the protective measures taken at home – see below) that are known to be beneficial for people experiencing a psychological suffering

(Kang et al., 2020).

Moreover, analysing the different categories of workers involved in the study, we noticed that, according to Dai et al. (n.d.), nurses perceived a higher risk of being infected compared to physicians and other healthcare workers, and were more worried about the possibility that their family members could be infected. This may be due by the fact that nurses work closer to the patients than physicians and other workers do, carrying out activities that often require repetitive and long-lasting contact with them. This, added to the fact that they received fewer swabs compared to physicians, objectively increases their probability of being infected and becoming potential carrier of the virus, maybe asymptomatic, causing transmission among relatives (Chew et al., 2020).

Despite these differences in risk perception and fear of contagion, we did not find any significant differences among workers regarding the anti-contagion precautions adopted at home which suggests a generalized will to protect their relatives in the way that was the most feasible for them.

Effects of COVID-19 on the hospital working routine

Most of responders perceived that their working routine was moderate or significantly modified by the COVID-19 spread, mainly because of the prolonged use of PPE, the increased working tension, the impossibility to carry out normal leisure activities after work and the increased working pressure.

The COVID-19 spread has dramatically affected the entire health care system, while the working life of healthcare professionals has been highly disrupted. This was mainly due to the introduction of new policies and processes that have significantly changed the normal routine, often generating rigid and mechanical procedures with consequent negative effects on working pressure and tension. At the same time, the high level of contagiousness of the virus and the consequent lockdown imposed by the Italian authorities have eliminated the possibility of promoting the work–life balance (Yester, 2019) spending free time with family and friends and practicing hobbies and leisure activities after work, inducing a severe deprivation of social support that is a relevant protective factor for mental health (Adriaenssens et al., 2015).

It is also interesting to notice that the prolonged use of PPE was considered the first element negatively impacting the responders' working activity since it causes an inevitable physical fatigue, due to the difficult of moving, the increase in body temperature and the limitation in the essential physical needs (and even pain, sometimes). Furthermore, PPE induce a severe mental stress related to the impossibility of getting rid of their “shell”, including feeling of oppression, constraint up to symptoms of claustrophobia and difficult relationships with colleagues.

COVID-19 and mental health outcomes

Overall, 29.6%, 22.8%, and 44.9% of all participants reported symptoms of moderate to severe anxiety, depression, and distress, respectively, indicating a significant incidence of psychological symptoms in the responders' sample (see Table 2). These data indicate a general higher burden of psychological symptoms in the Italian workers compared to those found by the first Chinese studies (Chew et al., 2020), but a similar incidence if compared with the later ones (Lai et al., 2020). This may explained by the fact that the more time passes from the beginning of pandemic to data collection, the higher is the incidence of distress symptoms that are known to worsen in the long-term. Moreover, according to our data and in line with the existing literature (Kisely et al., 2020; Lai et al., 2020; Wong et al., 2005), female sex and nursing profession appeared as relevant risk factors for developing more severe psychological symptoms. With regard to sex differences, it is well known that men are used to adopt coping strategies such as rationalization, which lead to a greater emotional distance from patients and therefore to a lower emotional distress, while women usually manifest high levels

of personal, emotional and psychological involvement, that inevitably leads to a greater psychological burden (Meléndez et al., 2012). On the other hand, in relation to the professional category, mental suffering induces identifying mechanisms, especially on nurses who use to take care of patients for a longer time compared to other professionals, often without the adequate protections (Mok et al., 2005). Moreover, nurses are also often exposed to the patients' mental suffering, especially when relatives and caregivers are not allowed to do it due to the restrictions caused by the epidemic/pandemic spread.

Results from multivariate analyses show that other than sex and profession, the fear of being infected was the main source of psychological burden in our sample. This is certainly due to the responders' worries of contracting a dangerous illness, but maybe also to the fear of becoming a carrier of the virus, causing transmission among fellow healthcare workers and their own families (Kisely et al., 2020). Also results of two previous studies conducted during the current COVID-19 outbreak (Wang et al., 2020) and the previous Ebola crisis (Matua & Van Der Wal, 2015) found a sense of intense fear, stigmatization and ostracism when healthcare workers displayed physical symptoms suggestive of the virus infection, which often leads to negative psychological pain (Nezlek et al., 2012; Troyer et al., 2020). Moreover, we found that the duration of the COVID-19 impact, as perceived by workers, determined the level of anxiety, probably due to the prolonged exposure to the new stressful condition, while being a nurse specifically determined the level of distress and avoidance (intended as the attempt to escape thoughts or feelings related to the COVID-19 experience). Finally, we found that, regardless any other confounding variable, directly attending COVID patients had a significant impact on intrusive thoughts and hyperarousal related to the COVID-19 pandemic, maybe, once again, because of the fear of contagion and/or because of the daily workers' exposure to the dramatic effects of the COVID-19 spread.

In conclusion, our data represent a significant evidence of the impact of COVID-19 on the Italian healthcare workers' mental burden, and clearly show that hailing them as “heroes” is not sufficient to protect them from the negative psychological consequences that may be generated by a pandemic spread. In our opinion, these data should be urgently taken into consideration not only by mental health professionals, that are called to find effective approaches to support front-line workers, such as those recently suggested by WHO (WHO, 2020a), but also by Italian policy makers that are expected to set up new policies to protect them from unacceptable conditions such as shortages in critical protective equipment or inadequate economic treatments, especially in regard of those categories that appear to be at higher risk (i. e. females and nurses).

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Declaration of competing interest

None.

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