BMJ Open

Levels of burn-out among healthcare workers during the COVID-19 pandemic and their associated factors: a cross-sectional study in a tertiary hospital of a highly burdened area of north-east Italy

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ABSTRACT

Objective To determine burn-out levels and associated factors among healthcare personnel working in a tertiary hospital of a highly burdened area of north-east Italy during the COVID-19 pandemic.

Design Observational study conducted from 21 April to 6 May 2020 using a web-based questionnaire.

Setting Research conducted in the Verona University Hospital (Veneto, Italy).

Participants Out of 2195 eligible participants, 1961 healthcare workers with the full range of professional profiles (89.3%) completed the survey.

Primary outcome measure Levels of burn-out, assessed by the Maslach Burnout Inventory-General Survey (MBI-GS). Multivariable logistic regression analysis was performed to identify factors associated with burn-out in each MBI-GS dimension (emotional exhaustion, EX; professional efficacy, EF; cynicism, CY).

Results Overall, 38.3% displayed high EX, 46.5% low EF and 26.5% high CY. Burn-out was frequent among staff working in intensive care units (EX 57.0%; EF 47.8%; CY 40.1%), and among residents (EX 34.9%; EF 63.9%; CY 33.4%) and nurses (EX 49.2%; EF 46.9%; CY 29.7%). Being a resident increased the risk of burn-out (by nearly 2.5 times) in all the three MBI subscales and being a nurse increased the risk of burn-out in the EX dimension in comparison to physicians. Healthcare staff directly engaged with patients with COVID-19 showed more EX and CY than those working in non-COVID wards. Finally, the risk of burn-out was higher in staff showing pre-existing psychological problems, in those having experienced a COVID-related traumatic event and in those having experienced interpersonal avoidance in the workplace and personal life.

Conclusions Burn-out represents a great concern for healthcare staff working in a large tertiary hospital during the COVID-19 pandemic and its impact is more burdensome for front-line junior physicians. This study underlines the need to carefully address psychological well-being of healthcare workers to prevent the increase of burn-out in the event of a new COVID-19 healthcare emergency.

Strengths and limitations of this study

► Strengths of this study include the large sample size, the representativeness of the sample with respect to the overall hospital population, the wide array of occupational profiles considered and data collection performed during the lockdown period of the pandemic.

► The relevance of this study should be also viewed in the light of the fact that it was conducted in the province of Verona (Veneto), one of the most burdened Italian areas, both in terms of deaths and infected COVID-19 cases.

► The response rate was relatively low (however, literature reports that web-based surveys conducted among physicians and healthcare workers have generally response rates similar to that of our study).

► Personality traits or individual psychological characteristics were not considered among possible predictors.

► Other contextual and organisational variables that might have exerted a significant role in the prediction of burn-out were not included in the analyses.

► The cross-sectional nature of this survey did not allow for the determination of causal relationships.

INTRODUCTION

Since the beginning of the COVID-19 pandemic, healthcare workers have been under heavy workload conditions worldwide. Limited resources, longer shifts, disruptions to sleep and work–life balance, and occupational hazards associated with exposure to patients with COVID-19 have contributed to adverse psychological outcomes among healthcare workers in terms of post-traumatic stress, insomnia, anxiety and depression.[1–3] The COVID-19 pandemic may have also negatively impacted healthcare workers in

terms of increased burn-out.[4] Burn-out is a psychological syndrome developing as a negative reaction to occupational stressors,[5] composed by a combination of emotional exhaustion, depersonalisation and low personal accomplishment.[6] Emotional exhaustion is related to an individual's experience of stress, which is, in turn, related to a decline in emotional and physical resources. Depersonalisation (or cynicism) refers to detachment from work in reaction to the overload of exhaustion and pertains to the loss of enthusiasm and passion for one's work.[7] Personal accomplishment refers to the feelings of low professional efficacy and lack of productivity at work.[7] The consequences of burn-out are not restricted to the workers' health, but also affect the quality of care provided and the organisational well-being.[8]

Before the pandemic, the clinical workforce in most Western countries had experienced a rise in burn-out.[4] The COVID-19 pandemic may have exacerbated an already existing problem within overstretched healthcare systems, thus further increasing the pernicious effects of burn-out. During the COVID-19 pandemic burn-out has been less extensively explored than other psychological outcomes. The limited available literature is still conflicting. A survey conducted in China found a high prevalence of burn-out among front-line nurses.[9] Conversely, another study also conducted in China found that physicians and nurses working in COVID-19 wards had lower frequencies of burn-out than those working in usual wards.[10] Another study conducted on Italian front-line healthcare workers found that the percentage of those reporting high levels of burn-out was higher than the one found in other Italian samples before the pandemic[11]; however, the generalisability of findings is questionable, since the study was conducted on a convenience sample of people using social media. Finally, a study carried out in the University Hospital of Augsburg (Germany) found that nurses working in COVID-19 wards had higher levels of burn-out compared with their colleagues working in usual wards, whereas no difference in terms of burn-out was found between physicians working in COVID-19 wards with respect to those of usual wards[12]; the generalisability of these findings, however, was also limited due to a relatively small sample size and the fact that no information was given on the representativeness of the sample with respect to the overall hospital staff.

The present study was undertaken aiming to: (1) assess the extent of burn-out in a large representative sample of healthcare personnel working in the Verona University Hospital during the COVID-19 pandemic, and (2) explore factors associated to burn-out by considering both personal and work-related characteristics, together with COVID-related factors.

METHODS
Study design
This study was conducted within the context of an ongoing longitudinal project aiming to assess the psychological impact of COVID-19 among Verona University Hospital workers during the lockdown phase, after 2 months and at 1 year.[13] Data collection was performed from 21 April to 6 May 2020 using a web-based questionnaire hosted on the online platform 'SurveyMonkey'. The study description, the invitation to participate and the link to the online questionnaire were published in the hospital's newsletter and sent via email by the trust administration to all hospital workers. The survey was anonymous, and confidentiality of information was ensured.

Setting and participants
The Verona University Hospital is a large academic hospital located in Veneto, the first Italian region (with Lombardy) hit by the pandemic and one of the most burdened Italian regions in terms of infected persons and deaths for COVID-19. It is the second largest hospital trust in Italy in terms of beds and the fifth largest in terms of admissions. The hospital staff is composed of 5940 personnel (including nearly 1200 residents of the medical specialty schools at the University of Verona). All health and administrative employees working in the Verona University Hospital during the lockdown phase of the pandemic were asked to participate in the study.

Outcomes and covariates
Burn-out was assessed by the Maslach Burnout Inventory-General Survey (MBI-GS).[14] The MBI-GS is a modified version of the original MBI[6] that was specifically designed to assess burn-out in any occupational setting. We decided to use the MBI-GS, as this scale is based on the assumption that burn-out takes the same form in all occupational sectors and it is related to the general performance of work, rather than on relationships at work (eg, with patients)—that is, burn-out can occur anytime and anywhere there is a major imbalance, or mismatch, between demands in the work environment and the individual's available resources.[7] The MBI-GS was found to be reliable and valid across multiple cultural settings and occupations, including healthcare professionals.[15–18] It consists of 16 items constituting three subscales that parallel those of the original MBI: emotional exhaustion (EX; 5 items) covers the experience of both emotional and physical fatigue; cynicism (CY; 5 items) reflects indifference, detached attitude towards work and active disengagement from work; professional efficacy (EF; 6 items) consists of feelings of competence, successful achievement and accomplishment in one's work, which diminish when burn-out is developing. All MBI-GS items are scored on a 7-point rating scale ranging from 0 (never) to 6 (always). Since the MBI-GS authors[19] recommend not to use cut-off scores obtained in one country to classify subjects in another county, we used the only Italian cut-off scores available in the literature for the healthcare sector (>2.20 for EX, >2.00 for CY and <3.66 for EF); these cut-off scores were tested on a large sample of mental health professionals working in the Veneto region.[20]

Personal background information and job-related factors were collected, including sex, age, living condition, occupation, having pre-existing psychological problems (ie, developed before the COVID-19 outbreak) requiring specialised help, length of working experience and place of work (hospital unit). For the purpose of analysis, the various hospital units were stratified according to the degree of clinical engagement with patients with COVID-19, from most engaged to least engaged: intensive care units (ICU; that during the lockdown phase were entirely dedicated to critically ill patients with COVID-19), subintensive COVID wards (ie, infectious disease, pulmonary medicine and internal medicine wards specifically dedicated to COVID-19), front-line services dealing with patients with COVID-19 (ie, radiology and emergency department), non-COVID wards, laboratory diagnostic services (ie, laboratory medicine, transfusion medicine, immunology, pathology, microbiology) and administration.

COVID-19 work-related information was also collected. Specifically, participants were questioned on the occurrence of related traumatic experiences at work, their personal condition ('in isolation as tested positive or hospitalisation for COVID-19' vs none), if they had to move out of the family house to protect family members and if they had to make changes to their personal habits or lifestyle. Finally, three ad hoc schedules were administered exploring: (1) COVID-19-related job stress[21] ('There was more conflict among colleagues at work'; 'I had to do work that normally I do not do'; 'I had an increased workload'); (2) COVID-19-related perception of risk in the workplace ('I shouldn't be looking after patients with COVID-19' (avoidance of patient); 'I accept the risk of getting COVID-19 as part of my job' (acceptance of risk); 'I am afraid of falling ill with COVID-19' (fear)); (3) COVID-19-related perceived interpersonal avoidance[22] ('I thought that people avoided me because of my profession', 'I thought that people avoided my family because of my profession', 'I thought that my family avoided me because of my profession') and avoidant safety behaviour ('I avoided colleagues who might be exposed to COVID-19'; 'I was afraid to infect my family members when going back home from work'). For the purpose of analysis, the three items exploring perceived interpersonal avoidance were collapsed into one 'perceived avoidance scale' and the two items of avoidant safety behaviours into a 'safety behaviour scale', both ranging from '0' (no perceived interpersonal avoidance/no avoidant safety behaviours) to '4' (high perceived interpersonal avoidance/high avoidant safety behaviours).

Statistical analysis

Statistical analyses were carried out using SPSS V.22 and Stata V.15. Descriptive statistics were given by frequencies and percentages. Comparisons between categorical variables were performed by χ^2 or Fisher's exact tests, where appropriate. The association between each burn-out domain (emotional exhaustion, cynicism and professional efficacy) and each potential risk factor selected a priori, on clinical or empirical grounds and derived from the relevant literature, was explored by estimating unadjusted ORs and 95% CIs using univariate logistic regression models. Subsequently, multivariate logistic regression models for the same outcomes gave adjusted ORs and 95% CIs. Goodness-of-fit measures were estimated for these models. The alpha level was set to 0.05 for all effects.

Patient and public involvement

Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research.

RESULTS

Personal and work-related characteristics

Overall, 2195 workers (36.9% of the eligible population) participated in the online survey. The representativeness of participants was assessed by comparing the study sample with the overall eligible population on two key characteristics for the aims of this study and for which official statistics from the Verona University Hospital were available, that is, occupation and exposure to patients with COVID-19. For details, see online supplemental part 1. Overall, the study sample overlapped with the Verona University Hospital staff both in terms of occupational profile composition and percentage of healthcare workers employed in units directly engaged with patients with COVID-19, thus indicating that selection of participants did not produce a biased sample. The sample addressed here may be therefore considered representative of the overall hospital population.

MBI-GS was completed by 1961 out of 2195 (89.3%) healthcare workers. Completers differed from non-completers (n=234) only in terms of occupational profile and exposure to COVID-related traumatic events. Specifically, physicians (93.5% completers vs 6.5% non-completers) and residents (92.8% completers vs 7.2% non-completers) were more likely to complete the MBI-GS compared with nurses (87.7% completers vs 12.3% non-completers), other healthcare staff (84.7% completers vs 12.6% non-completers) and administrative staff (88.2% completers vs 11.8% non-completers) (χ^2 test, p=0.003). Moreover, staff not exposed to COVID-related traumatic events were more likely to complete the MBI-GS (96.0% completers vs 4.0% non-completers) compared with exposed staff (88.3% completers vs 11.7% non-completers) (Fisher's exact test, p<0.001).

Personal and work-related characteristics, together with COVID-19 work-related information within the study sample, are detailed in table 1.

Job stress, perception of risk and interpersonal avoidance among healthcare workers

As shown in table 2, half of the sample perceived more conflicts among colleagues, 59.6% reported that they

Table 1 Personal and job characteristics of participants who completed the MBI-GS (n=1961)

	n	%
Sex (6 missing)		
Male	492	25.2
Female	1463	74.8
Age (5 missing)		
<36 years	633	32.4
36–55 years	980	50.1
>55 years	343	17.5
Living condition (6 missing)		
Alone	322	16.5
With family/other relatives	1633	83.5
Length of working experience (13 missing)		
<6 years	594	30.5
6–20 years	593	30.4
>20 years	761	39.1
Occupation		
Physicians	286	14.6
Residents	335	17.1
Nurses	687	35.0
Other healthcare staff	466	23.8
Administrative staff	187	9.5
Workplace (31 missing)		
Intensive care units	182	9.4
Subintensive care wards for patients with COVID-19*	164	8.5
Front-line services dealing with patients with COVID-19†	146	7.6
Non-COVID wards	1062	55.0
Laboratory diagnostic services‡	216	11.2
Administration	160	8.3
Having pre-existing psychological problems		
Yes	120	6.1
No	1841	93.9
Experienced COVID-related traumatic event		
No	759	38.7
Yes	1202	61.3
Personal condition in relation to COVID-19		
Isolation as tested positive/ hospitalisation for COVID	295	15.0
None	1666	85.0
Move out of the family house to protect family members (12 missing)		
No	1762	90.4
Yes	187	9.6
Changes in personal lifestyle due to COVID-19 (18 missing)		
No	885	45.5

Continued

Table 1 Continued

	n	%
Yes	1058	54.5

*Infectious disease unit, pulmonary medicine, internal medicine units converted specifically to COVID-19.
†Radiology and emergency department.
‡Laboratory medicine, transfusion medicine, immunology, pathology, microbiology.
MBI-GS, Maslach Burnout Inventory-General Survey.

had to do work they usually were not supposed to do and 65.3% had an increased workload.

As regards the perception of risk, 66.5% reported having felt uncomfortable when looking after patients with COVID-19 and 82.8% were afraid to get infected by SARS-CoV-2, even though 90% accepted the risk of getting COVID-19 as part of their work. Regarding interpersonal avoidance, 49.6% of hospital staff reported having been avoided by other people because of their profession, 26.7% reported their family members had been avoided for the same reason, 28.5% avoided at work colleagues who might have been exposed to patients with COVID-19 and 64.9% were afraid to infect their family members once back at home.

Prevalence of burn-out among healthcare workers

Overall, 38.3% (n=752) of participants displayed symptoms of high emotional exhaustion (EX), 46.5% (n=911) of low professional efficacy (EF) and 26.5% (n=519) of high cynicism (CY).

As shown in table 3, prevalence of burn-out was high among staff working in both ICUs (EX 57.0%; EF 47.8%; CY 40.1%) and subintensive care wards for patients with COVID-19 (EX 53.0%; EF 47.6%; CY 22.6%) and, with respect to the occupational profile, among residents (EX 34.9%; EF 63.9%; CY 33.4%) and nurses (EX 49.2%; EF 46.9%; CY 29.7%).

Burn-out was also more frequent among healthcare workers who had been in treatment for psychological problems (EX 58.3%; EF 57.5%; CY 39.2%) and among those who had experienced a COVID-related traumatic event at work (EX 49.8%; EF 48.3%; CY 30.3%). Finally, burn-out was frequent among healthcare workers who had decided to move out of the family house to protect other family members from a possible contagion (EX 46.5%; EF 54.5%; CY 34.2%) and those who had to change their personal habits and lifestyle due to COVID-19 (EX 43.7%).

Details on job stress, perception of risk and interpersonal avoidance across the three burn-out domains are given in the online supplemental part 2. In brief, burn-out (particularly in its EX component) was more frequent among healthcare workers who had reported higher stress at work, those who perceived themselves to be at higher risk of contagion and those who had experienced social avoidance because of their profession.

Table 2 Job stress, perception of risk and interpersonal avoidance in the participants assessed by MBI-GS (n=1961)

		n	%
Job stress	*There were more conflicts among colleagues.*		
	Yes	990	50.5
	No	971	49.5
	I had to do work that I usually don't do.		
	Yes	1169	59.6
	No	792	40.4
	I had an increased workload.		
	Yes	1281	65.3
	No	680	34.7
Perception of risk	*I should have not looked after patients with COVID-19.**		
	No	822	66.5
	Yes	415	33.5
	I accepted the risk of getting COVID-19 as part of my job.†		
	No	134	9.2
	Yes	1316	90.8
	I was afraid of falling ill with COVID-19.		
	No	337	17.2
	Yes	1624	82.8
Perceived interpersonal avoidance	*People avoided me because of my job.*		
	No	659	33.6
	As usual	329	16.8
	Yes	973	49.6
	People avoided my family because of my job.		
	No	1029	52.5
	As usual	409	20.9
	Yes	523	26.7
	My family avoided me because of my job.		
	No	1192	60.8
	As usual	318	16.2
	Yes	451	23.0
Safety behaviour	*I avoided colleagues who might be exposed to COVID-19.*		
	No	928	47.3
	As usual	474	24.2
	Yes	559	28.5
	I was afraid to infect my family members.		
	No	439	22.4
	As usual	249	12.7
	Yes	1273	64.9

*724 subjects did not have contact with patients with COVID-19.
†511 subjects did not have contact with patients with COVID-19.
MBI-GS, Maslach Burnout Inventory-General Survey.

Factors influencing healthcare workers' burn-out

Univariate analyses estimating the association between each MBI-GS dimension and the various potential risk factors were first performed. Details are given in online supplemental part 3.

Variables showing significant univariate associations were finally entered in multivariate analyses (see table 4). Several univariate associations lost their significance while other personal associations remained significant.

Table 3   Personal and job-related characteristics across the three burn-out domains (n=1961)

	Emotional exhaustion			Professional efficacy			Cynicism		
	≤2.20 n (%)	>2.20 n (%)	P value	≥3.66 n (%)	<3.66 n (%)	P value	≤2.00 n (%)	>2.00 n (%)	P value
Sex									
Male	347 (70.5)	145 (29.5)	***	277 (56.3)	215 (43.7)		357 (72.6)	135 (27.4)	
Female	857 (58.6)	606 (41.4)		770 (52.6)	693 (47.4)		1081 (73.9)	382 (26.1)	
Living condition									
With family/other relatives	1030 (63.1)	603 (36.9)		890 (54.5)	743 (45.5)		1216 (74.5)	417 (25.5)	
Alone	176 (54.7)	146 (45.3)	**	157 (48.8)	165 (51.2)		222 (68.9)	100 (31.1)	*
Workplace									
Intensive care units	78 (42.9)	104 (57.1)	***	95 (52.2)	87 (47.8)		109 (59.9)	73 (40.1)	***
Subintensive care wards for patients with COVID-19†	77 (47.0)	87 (53.0)		86 (52.4)	78 (47.6)		127 (77.4)	37 (22.6)	
Other front-line units dealing with patients with COVID-19‡	89 (61.0)	57 (39.0)		82 (56.2)	64 (43.8)		104 (71.2)	42 (28.8)	
Non-COVID wards	692 (65.2)	370 (34.8)		552 (52.0)	510 (48.0)		798 (75.1)	264 (24.9)	
Laboratory diagnostic services§	139 (64.4)	77 (35.6)		120 (55.6)	96 (44.4)		163 (75.5)	53 (24.5)	
Administration	113 (70.6)	47 (29.4)		98 (61.3)	62 (38.8)		121 (75.6)	39 (24.4)	
Length of working experience									
<6 years	387 (65.2)	207 (34.8)		266 (44.8)	328 (55.2)	***	418 (70.4)	176 (29.6)	**
6–20 years	349 (58.9)	244 (41.1)		328 (55.3)	265 (44.7)		424 (71.5)	169 (28.5)	
>20 years	465 (61.1)	296 (38.9)		447 (58.7)	314 (41.3)		590 (77.5)	171 (22.5)	
Occupation									
Physicians	208 (72.7)	78 (27.3)	***	174 (60.8)	112 (39.2)	***	229 (80.1)	57 (19.9)	***
Residents	218 (65.1)	117 (34.9)		121 (36.1)	214 (63.9)		223 (66.6)	112 (33.4)	
Nurses	349 (50.8)	338 (49.2)		365 (53.1)	322 (46.9)		483 (70.3)	204 (29.7)	
Other healthcare staff	298 (63.9)	168 (36.1)		276 (59.2)	190 (40.8)		360 (77.3)	106 (22.7)	
Administrative staff	136 (72.7)	51 (27.3)		114 (61.0)	73 (39.0)		147 (78.6)	40 (21.4)	
Having pre-existing psychological problems									
No	1159 (63.0)	682 (37.0)	***	999 (54.3)	842 (45.7)	**	1369 (74.4)	472 (25.6)	***
Yes	50 (41.7)	70 (58.3)		51 (42.5)	69 (57.5)		73 (60.8)	47 (39.2)	
COVID-19-related traumatic event									
None	605 (79.7)	154 (20.3)	***	428 (56.4)	331 (43.6)	*	604 (79.6)	155 (20.4)	***
Yes	604 (50.2)	598 (49.8)		622 (51.7)	580 (48.3)		838 (69.7)	364 (30.3)	
Personal condition in relation to COVID-19									
No	1041 (62.5)	625 (37.5)		904 (54.3)	762 (45.7)		1235 (74.1)	431 (25.9)	
Isolation as tested positive/hospitalisation for COVID	168 (56.9)	127 (43.1)		146 (49.5)	149 (50.5)		207 (70.2)	88 (29.8)	
Move out of the family house to protect family members									
No	1102 (62.5)	660 (37.5)	*	959 (54.4)	803 (45.6)	*	1309 (74.3)	453 (25.7)	**
Yes	100 (53.5)	87 (46.5)		85 (45.5)	102 (54.5)		123 (65.8)	64 (34.2)	
Changes in personal lifestyle due to COVID-19									
No	601 (67.9)	284 (32.1)	***	461 (52.1)	424 (47.9)		660 (74.6)	225 (25.4)	
Yes	596 (56.3)	462 (43.7)		580 (54.8)	478 (45.2)		767 (72.5)	291 (27.5)	

***P<0.001; **p<0.01; *p<0.05.
†Infectious disease unit, pulmonary medicine, internal medicine units converted specifically to COVID-19.
‡Radiology and emergency department.
§Laboratory medicine, transfusion medicine, immunology, pathology, microbiology.

Table 4 Multivariate logistic regression models for the three burn-out domains

		Emotional exhaustion		Professional efficacy		Cynicism	
		Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Sex	Male	1		1		1	
	Female	1.38 (1.06 to 1.79)	0.016	1.13 (0.90 to 1.43)	0.294	0.83 (0.64 to 1.08)	0.173
Living condition	With family/other relatives	1		1		1	
	Alone	1.70 (1.27 to 2.28)	<0.001	1.09 (0.83 to 1.42)	0.538	1.24 (0.93 to 1.67)	0.143
Workplace	Intensive care units	1	**	1		1	*
	Subintensive care wards for patients with COVID-19	0.73 (0.46 to 1.17)	0.190	1.04 (0.67 to 1.63)	0.849	0.47 (0.28 to 0.77)	0.003
	Front-line services dealing with patients with COVID-19	0.61 (0.37 to 1.00)	0.049	0.97 (0.61 to 1.55)	0.907	0.69 (0.42 to 1.14)	0.146
	Non-COVID wards	0.53 (0.37 to 0.77)	0.001	1.10 (0.77 to 1.56)	0.600	0.60 (0.42 to 0.87)	0.007
	Laboratory diagnostic services	0.70 (0.43 to 1.15)	0.163	1.10 (0.69 to 1.74)	0.693	0.71 (0.43 to 1.17)	0.180
	Administration	0.53 (0.29 to 0.96)	0.037	0.86 (0.50 to 1.47)	0.578	0.69 (0.38 to 1.26)	0.228
Length of working experience	<6years	1		1		1	
	6–20years	1.77 (1.27 to 2.47)	0.001	1.01 (0.75 to 1.37)	0.923	1.26 (0.90 to 1.77)	0.179
	>20years	1.69 (1.22 to 2.35)	0.002	0.90 (0.67 to 1.21)	0.486	0.93 (0.66 to 1.32)	0.698
Occupation	Physicians	1	**	1	***	1	**
	Residents	1.82 (1.13 to 2.94)	0.014	2.61 (1.71 to 3.98)	<0.001	2.02 (1.24 to 3.27)	0.004
	Nurses	1.75 (1.23 to 2.49)	0.002	1.29 (0.94 to 1.76)	0.113	1.69 (1.17 to 2.45)	0.006
	Other healthcare staff	1.22 (0.83 to 1.79)	0.299	0.98 (0.70 to 1.37)	0.901	1.24 (0.83 to 1.87)	0.290
	Administrative staff	1.19 (0.68 to 2.08)	0.550	1.10 (0.68 to 1.78)	0.706	1.22 (0.68 to 2.19)	0.500
Other personal information	*Having pre-existing psychological problems*						
	No	1		1		1	
	Yes	2.35 (1.53 to 3.60)	<0.001	1.60 (1.08 to 2.36)	0.019	1.84 (1.23 to 2.75)	0.003
	COVID-19-related traumatic event						
	No	1		1		1	
	Yes	2.40 (1.88 to 3.07)	<0.001	1.10 (0.88 to 1.37)	0.393	1.37 (1.06 to 1.76)	0.016
Job stress	*Increased conflict among colleagues*						
	No	1		1		1	

Continued

Table 4 Continued

		Emotional exhaustion		Professional efficacy		Cynicism	
		Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
	Yes	1.48 (1.20 to 1.83)	<0.001	1.20 (0.99 to 1.46)	0.058	1.49 (1.20 to 1.86)	<0.001
	Additional task assignment						
	No	1		1		1	
	Yes	1.51 (1.19 to 1.91)	0.001	0.83 (0.67 to 1.03)	0.086	1.45 (1.13 to 1.85)	0.004
	Increased workload						
	No	1		1		1	
	Yes	1.73 (1.33 to 2.25)	<0.001	0.97 (0.77 to 1.22)	0.783	0.87 (0.66 to 1.14)	0.319
Interpersonal avoidance	*Perceived avoidance (0=no to 4=high)*	1.06 (0.96 to 1.18)	0.232	1.16 (1.05 to 1.27)	0.003	1.15 (1.03 to 1.28)	0.012
	Safety behaviours (0=no to 4=high)	1.29 (1.15 to 1.45)	<0.001	1.12 (1.01 to 1.25)	0.026	1.13 (1.01 to 1.28)	0.034
	Observations (n)	1887		1887		1887	
	LR test, p value	381.79	<0.001	104.15	<0.001	128.79	<0.001
	Hosmer-Lemeshow goodness of fit (10 groups)						
	$\chi^2(8)$, p value	3.41	0.906	3.01	0.933	4.68	0.791
	Pearson goodness of fit						
	Covariate patterns (n)	1868		1868		1868	
	$\chi^2(1803)$, p value	1867	0.342	1868.75	0.332	1853.67	0.426
	Area under ROC curve	0.756		0.632		0.664	

Overall LR test: *p<0.05; **p<0.01; ***p<0.001.
LR, likelihood ratio; ROC, receiver operating characteristic.

Work-related and COVID-related factors were entered together into the models.

Adjusted ORs indicated that being a woman (1.38; 95% CI 1.06 to 1.79), living alone (1.70; 95% CI 1.27 to 2.28), having longer work experience (6–20 years: 1.77; 95% CI 1.27 to 2.47; >20 years: 1.69; 95% CI 1.22 to 2.35), being a resident (1.82; 95% CI 1.13 to 2.94) and a nurse (1.75; 95% CI 1.23 to 2.49) (in comparison to physician), having pre-existing psychological problems (2.35; 95% CI 1.53 to 3.60), having experienced COVID-related traumatic event at work (2.40; 95% CI 1.88 to 3.07), having perceived more conflicts among colleagues at work (1.48; 95% CI 1.20 to 1.83), having experienced more workload (1.73; 95% CI 1.33 to 2.25), being assigned additional tasks (1.51; 95% CI 1.19 to 1.91) and having exhibited safety behaviours (1.29; 95% CI 1.15 to 1.45) increased the risk of high emotional exhaustion. On the other hand, working in front-line services dealing with patients with COVID-19 (0.61; 95% CI 0.37 to 1.00), in non-COVID wards (0.53; 95% CI 0.37 to 0.77) and in the administration (0.53; 95% CI 0.29 to 0.96) was associated with a reduced risk of emotional exhaustion as compared with working in ICUs.

The risk to experience low professional efficacy was grater for residents (2.61; 95% CI 1.71 to 3.98) in comparison to physicians, for those who had developed psychological problems before the pandemic outbreak (1.60; 95% CI 1.08 to 2.36), those who had experienced social avoidance due to their profession (1.16; 95% CI 1.05 to 1.27) and those who exhibited safety behaviours (1.12; 95% CI 1.01 to 1.25).

The risk of high cynicism was greater for residents (2.02; 95% CI 1.24 to 3.27) and nurses (1.69; 95% CI 1.17 to 2.45) as compared with physicians, for those who had pre-existing psychological problems (1.84; 95% CI 1.23 to 2.75), for those who experienced COVID-related traumatic event at work (1.37; 95% CI 1.06 to 1.76), for those who perceived more conflicts among colleagues (1.49; 95% CI 1.20 to 1.86), for those who were assigned additional tasks (1.45; 95% CI 1.13 to 1.85), those who had experienced social avoidance due to their profession (1.15; 95% CI 1.03 to 1.28) and those who exhibited safety behaviours (1.13; 95% CI 1.01 to 1.28). On the other hand, working in subintensive COVID-19 units (0.47; 95% CI 0.28 to 0.77) and non-COVID wards (0.60; 95% CI 0.42 to 0.87) was associated with a reduced risk of cynicism in comparison to working in ICUs.

DISCUSSION
Overall, we found that a relevant proportion of healthcare staff working in the Verona hospital reported symptoms of burn-out, and its impact was more burdensome for front-line healthcare workers: specifically, at least half of healthcare workers who provided either intensive or subintensive care to patients with COVID-19 reported high levels of emotional exhaustion and feelings of low professional efficacy, and 40% showed high levels of cynicism

and detached attitude towards their job. This is a relevant finding. In fact, it should be noted that the percentage of front-line healthcare workers showing symptoms of burn-out in our study is considerably higher than those reported in Italy before the COVID-19 pandemic among staff working in a number of clinical settings, including ICUs,[23–26] medical wards[27–30] and emergency units[31] (see online supplemental part 4). It is thus reasonable to assume that the excess of workers experiencing high levels of burn-out found here, with respect to percentages reported in the literature, is due to the specific work-related burden posed by the COVID-19 pandemic.

Our findings are consistent with research on past outbreaks of severe acute respiratory syndrome (SARS), Middle East respiratory syndrome and H1N1, reporting that front-line healthcare workers do experience considerable levels of burn-out.[32] The finding that burn-out is more prevalent among front-line healthcare workers compared with staff working in non-COVID wards contrasts with a recent study conducted in China, reporting that front-line staff had a lower frequency of burn-out as compared with those working in usual wards.[10] We may speculate that the healthcare system in China was more ready than other countries to tackle the challenge posed by the COVID-19 pandemic, having already developed protocols and procedures to counteract past outbreaks (eg, SARS or H1N1); therefore, Chinese healthcare workers might have had some expertise in managing such kinds of emergencies due to their involvement in previous infectious outbreaks.

It should be noted that it is not simply the direct contact with patients with COVID-19 per se a risk factor for developing burn-out, but rather the engagement with severely (or critically) ill patients with COVID-19 requiring subintensive or intensive care, since, for example, for emotional exhaustion, staff working in services dealing on daily basis with great numbers of patients with COVID-19 (such as radiology and emergency department) tend to display a lower risk of burn-out than staff working in subintensive or ICUs, and however the same risk of those working in non-COVID units. Therefore, to minimise the risk of burn-out during pandemic outbreaks, hospital administrations should recruit additional staff to unburden front-line healthcare workers from non-clinical tasks, and restrict excessive workload by scheduling breaks, limit work hours in subintensive and ICUs, and provide—when needed—regular psychosocial support.

We also found that nurses and resident physicians were the occupational categories more severely burdened by burn-out during the COVID-19 pandemic. Specifically, nurses displayed more emotional exhaustion, while residents were also at higher risk to experience a reduced sense of professional efficacy and to adopt detached attitudes towards their job. This is not an unexpected finding, since literature shows that nurses and residents are at increased risk of burn-out, in the light of the position they have within working organisation and the tasks they are generally assigned. This might have

been amplified during the COVID-19 pandemic. In fact, previous studies have reported that nurses are particularly vulnerable to burn-out, and emergency nurses at an even higher risk, since emergency nursing is characterised by unpredictability, overcrowding and continuous confrontation with a broad range of diseases, injuries and traumatic events.[33] During the COVID-19 pandemic, front-line nurses experienced sudden and dramatic challenges in the workplace in terms of increased workload, reassignment/redeployment to other roles or duties, infection threat, COVID-related traumatic events and frustration with the death of patients whom they care. This work overload may have contributed to burn-out among nurses by depleting their emotional capacity to meet the demands posed by the pandemic emergency. Thus, to minimise the risk of burn-out during pandemic outbreaks, hospital administrations should improve nurses' sense of control over their own scheduling and tasks by promoting their involvement in decision-making, particularly in demanding situations.

Previous research has also shown that the prevalence of burn-out is particularly high among residents.[34] Intense work demands, limited control and a high degree of work–home interference strongly predispose resident physicians to burn-out.[35] Resident physicians generally are the first-line health service providers, subjected to prolonged working hours, sleep deprivation and high job demands. Despite being young and inexperienced in the medical field, while also in the process of training, resident physicians normally treat patients with varying presentations and severity levels; at the same time, they are responsible for presenting reports to and taking orders from supervisors. Resident physicians are often confronted with the negative attitudes of their superiors, while also managing deceased and dying patients. High levels of responsibility coupled with role ambiguity and low levels of decisional autonomy are common among resident physicians and are associated with increased risk of burn-out.[36] To minimise the risk of burn-out during pandemic outbreaks, hospital administrations should train and leverage the expertise of residents as front-line workers to handle critical patients and support and supervise them as long as needed.

Having a pre-existing psychological problem consistently increases the risk of burn-out. A recent study conducted in the general population found that people with pre-existing mental health conditions are more susceptible to stressors associated with COVID-19 and are more likely do adopt dysfunctional coping strategies (eg, self-isolation) compared with those with no mental health disorder.[37] This process may also apply to healthcare workers, thus further increasing baseline levels of burn-out. Therefore, healthcare organisations should be aware that workers receiving treatment for ongoing psychological problems may be particularly vulnerable to the effect of adverse job conditions known to increase burn-out during pandemic emergencies. To minimise the risk of burn-out, hospital administrations should screen healthcare workers for ongoing psychological problems to protect the more vulnerable.

Having experienced a COVID-19-related traumatic event (eg, fear of becoming infected and/or infecting families, experiencing high mortality rates, grieving the loss of patients and colleagues, separation from families, changes in working practices and procedures, physical strain from prolonged wearing of personal protective equipment) increases the risk of burn-out, more specifically in terms of heightened emotional exhaustion and more detached attitude towards one's work. This is a relevant issue, since increased workplace stress resulting from COVID-related traumatic events, on the one hand, exacerbates baseline levels of burn-out and, on the other hand, when combined with underlying baseline burn-out may result in rising rates of post-traumatic stress disorders; thus, establishing and perpetuating a vicious cycle of chronic stress response.[38] To minimise the risk of burn-out, hospital administrations should ensure the availability of appropriate and comfortable personal protective equipment to avoid infections among healthcare workers; ensure the safety and health of all staff members by the regular health surveillance including screening of infection; and empower staff by providing consistent and updated guidelines for managing patients through triage based on the case priority and severity. These actions are currently underway in our hospital.

A further risk factor for burn-out during the COVID-19 pandemic is interpersonal avoidance, which consistently impacted all the three MBI-GS dimensions in our study. This is a composite factor that addresses interpersonal avoidance or social rejection experienced by healthcare workers in their daily life due to their profession (eg, social stigma) and safety behaviours adopted by healthcare workers to protect themselves or their family members from potential sources of infection. Literature published during SARS and Ebola epidemics found that healthcare workers are often avoided, rejected and stigmatised due to their perceived link with the infection.[39–41] Such experiences of social stigmatisation have detrimental effects on the personal life and emotional well-being of healthcare workers, as they may experience shame, guilt and sense of isolation. Also in the time of COVID-19, many healthcare workers have reported stigma from the public and family members.[42] This, in turn, may have a negative effect on the relationship of healthcare workers with their job, in terms of reduced sense of efficacy and more detached attitude towards their job. Additionally, maladaptive coping strategies adopted both in the workplace and at home, such as avoidant safety behaviours, may contribute to increase employee burn-out and work disengagement.[43] To minimise the risk of burn-out, hospital administrations should address work–life balance, promote connectedness and mutual support among healthcare workers and contrast social isolation and interpersonal avoidance.

Strengths and limitations

The strengths of this study include the large sample size, the representativeness of the sample with respect to the overall hospital population, the wide array of occupational profiles considered and data collection performed during the lockdown period of the pandemic.

Among the possible limitations, we should consider the relatively low response rate. However, web-based surveys have generally lower response rates than face-to-face or telephone interviews or mail surveys, with a meta-analysis[44] reporting a mean response rate similar to that of our study; it should also be noted that web-based surveys involving physicians or healthcare workers have even lower overall response rates.[45] Another limitation is that we did not include personality traits among burn-out predictors addressed here. Moreover, other contextual and organisational variables not considered in the analyses might have exerted a significant role in the prediction of burn-out. In addition, the cross-sectional nature of the survey did not allow for the determination of causal relationships. Finally, the generalisability of our findings to other nations should be taken with caution, as the study was conducted in the specificity of the Italian national healthcare system.

CONCLUSION

Burn-out is a major concern for healthcare staff working in a large tertiary hospital during the COVID-19 pandemic and its impact is more burdensome for front-line junior physicians. This study serves to provide important evidence for the directing and promotion of mental well-being among healthcare workers and to prevent the sudden increase of burn-out in the event of a new COVID-19 healthcare emergency.

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