Research Article

Psycho-Emotional Impact of the First Wave of the COVID-19 Pandemic in Health Care Workers of a Large COVID-19 European Hospital

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Introduction The SARS-CoV-2 pandemic has had a massive impact on public health, not only physically but also psycho-emotionally, especially in occupational groups professionally engaged in the care of COVID-19 patients.

Objectives The study was performed in a leading European COVID-19 hospital to assess the psychological distress experienced by workers (HCWs) engaged in COVID-19 wards in the early pandemic phase.

Methods The study population included 1229 workers from units taking care of SARS-CoV-2 patients. They were recruited by mailing them a questionnaire aimed at collecting the following information: 1) sociodemographic data; 2) depression, anxiety, and stress scales (DASS-21); 3) impact of event scale-revised (IES-R); 4) perceived stress scale (PSS); and 5) job interface analysis. The answers were collected via Google® forms and then statistically analysed. Regardless of the questionnaire outcome, psychological support was also offered on a voluntary basis.

Results Approximately two-thirds of the study population reported no symptoms according to the DASS-21 scale. Similarly, according to the IES-R scale, approximately 36% of subjects were not impacted by clinically valuable events; the remaining workers manifested subclinical or clinically valuable and impact. On the PSS scale, only 3% of the workers did not manifest stress symptoms,

while the remainder had stress symptoms but of mild magnitude. No statistically significant differences in the levels of depression investigated through different scales were apparent in the various occupational categories. Symptoms of anxiety, stress and depression were more pronounced in females, while higher stress levels were apparent in younger age groups. Only 51 workers, most of whom suffered from SARS-CoV-2 infection, required clinical psychological counseling, and more than half underwent subsequent psychological support.

Conclusions The obtained results are consistent with most literature data, whereby anxiety, depression and stress are associated with gender (female), age (18-44 *vs* over 55) and having cared for patients with COVID-19.

Introduction

The COVID-19 pandemic has been a traumatic event apart from the clinical consequences of infection on the psycho-emotional level of the general population and specific occupational groups professionally engaged directly and indirectly in the care of SARS-CoV-2 patients.

Many studies in the international scientific literature highlight the effects of SARS-CoV-2 on the psychic sphere of the general population [1][2][3] and that of specific occupational categories engaged professionally in health and care activities [4][5][6][7]. According to a systematic review of literature published up to April 2020, anxiety was assessed in 12 studies, with a pooled prevalence of 23·2%, and depression was assessed in 10 studies, with a prevalence rate of 22·8%. A subgroup analysis revealed gender and occupational differences, with females and nurses exhibiting higher rates of affective symptoms than males and medical staff, respectively. Insomnia prevalence was estimated at 38.9% across 5 studies [6].

Another systematic review reported moderate and high levels of stress, anxiety, depression, sleep disturbance and burnout, with diverse coping strategies and more frequent and intense symptoms among women and nurses, without conclusive results by age. In the first line of assistance, the psychological impact was greater than in the rest of the health professionals and in the Asian area [8]. In a multicenter study conducted during the first pandemic wave on 906 employees from 6 hospitals by questionnaire collecting the prevalence of symptoms in the past month, the Depression Anxiety Stress Scales (DASS-21) [9] and the Impact of Events Scale-Revised (IES-R) [10] instrument, anxiety

was detected in 5.3% of subjects, moderate to very severe depression in 8.7%, and moderate to extremely severe stress in 2.2% [11].

In another review, severe stress, depression, and anxiety symptoms were recorded in 2.2%-14.5% of all participants. The severity of mental symptoms was influenced by age, gender, occupation, specialty, type of work performed, and proximity to COVID-19 patients. Staff selection, preventive interventions, resilience, and social support were reported as mediating variables [12].

Some studies thus far have identified factors associated with mental health outcomes in health care workers (HCWs). These are limited resources of hospitals, threat of exposure to the virus as an added occupational hazard, longer shifts, disruption to sleep patterns, work–life balance, subsequent heightened dilemmas regarding patient duties versus fear of exposure to family members, neglect of personal and family needs with increased workload, and lack of sufficient communication and updated information. All of these have been identified as main factors contributing to increased physical and mental fatigue, anxiety, stress, and burnout [7].

Our work was carried out on workers of a socio-health territorial company in the Lombardy Region of Italy to assess the conditions of psychological distress experienced during the first SARS-CoV-2 pandemic phase and to respond to emerging needs with specific psychological support interventions.

Subjects and Methods

This retrospective observational study named PSI-COV-2 was conducted in the summer of 2020 at ASST Spedali Civili of Brescia, one of the largest University Hospital in Italy by number of employees, consisting of more than 8000 workers and admitting more than 2000 COVID-19 patients in the period 15/02/2020 - 31/05/2020. The study sample included approximately 2,500 workers employed in both hospital and territorial services dedicated to the care of patients affected by SARS-CoV-2, including physicians, nurses, obstetricians, support workers, psychologists, office workers and other health professionals (biologists, functional rehabilitation technicians, laboratory technicians, radiologists, etc.). Workers were recruited by e-mail, including a questionnaire (Supplemental material) that investigated the following areas: 1. Sociodemographic data; 2 Depression, Anxiety and Stress scale (DASS- 21) [9]; 3 Impact of event scale-revised (IES-R) [10]; 4 Perceived Stress Scale (PSS) [13][14]; 5 Work interface. Each enrolled worker gave his informed consent, compiled the questionnaire, and could express his interest, if any, in receiving counseling and psychological support from hospital

psychologists-psychotherapists. The study adhered to the Ethical Principles of the Helsinki Declaration, whereas approval by the local Ethics Committee was not necessary, as the study was performed as a health promotion activity in the context of the Occupational Health Surveillance, which in Italy is mandatory by law.

Assessment

The online survey included the following validated self-report questionnaires:

- Depression Anxiety Stress Scales 21 (DASS-21) [9] is a 21-item self-report questionnaire designed to measure depression, anxiety, and stress symptoms, with 7 items for each subscale. Each item ranges from 0 to 3. Sum scores for each subscale may range between 0 and 42, with higher scores indicating higher depression/anxiety/stress levels.

- Impact of Event Scale-Revised (IES-R) [10] is a 22-item self-report questionnaire designed to measure subjective distress symptoms caused by traumatic events. The IES-R comprises three subscales assessing intrusion (8 items), avoidance (8 items), and hyperarousal (6 items) symptoms. For this survey, participants had to refer to the COVID-19 emergency. IES-R items range from 0 to 4, with a total score ranging from 0 to 88. Higher scores indicate higher subjective distress symptoms.

- Perceived Stress Scale (PSS): [13] is a 10-item self-report questionnaire designed to measure the subjective perception of stress. It is a measure of the degree to which life situations are appraised as stressful, asking about feelings and thoughts during the last month. PSS items range from 0 to 4, with a total score ranging from 0 to 40. Higher scores indicated higher subjective perception of stress.

Statistical Methods

Data collected via Google® forms were imported into Microsoft-Excel® and then into IBM-SPSS® software ver. 26.0.1. The normality of continuous variables was evaluated by the Kolmogorov–Smirnov test. After descriptive variable analyses, we performed Pearson's correlation, χ^2 and Fisher's exact test analyses. Associations between variables in more than 2X2 tables were evaluated by the standard residual method, considering residuals as significant if higher than 1.96 in absolute value (z in the normal distribution). Five nominal regressions were then performed, always setting as dependent variables Y (outcome) the scores of psychological scales and as independent variables (predictors)

gender, age groups, occupational category and taking care of COVID-19 patients. All results were tested at the α significance level of 5%.

Results

A total of 1229 workers completed the questionnaire and were enrolled in the study. The main characteristics of the enrolled sample are summarized in Table 1.

Characteristics	Whole sample		Males		Females	
	N	%	N	%	N	%
Subjects	1229	-	290	23.6	939	76.4
Age groups*						
18 - 29 aa	165	13.4	30	10.3	135	14.4
30 - 44 aa	396	32.2	**108**	37.2	288	30.7
45 - 54 aa	473	38.5	99	34.1	**374**	39.8
> 55 aa	195	15.9	53	18.3	142	15.1
Job titles***						
Administrative clerks	26	2.1	5	1.7	21	2.2
Support HCWs	248	20.2	37	12.8	**211**	22.5
Nurses	638	51.9	135	46.6	503	53.6
Physicians	241	19.6	**98**	33.8	143	15.2
Other health professions	76	6.2	15	5.2	61	6.5
Previously affected by COVID-19						
No	966	78.6	220	75,9	746	79,4
Yes	263	21.4	70	24,1	193	20,6
Working in a COVID-19 ward						
Yes	1020	83	247	79.7	773	84.1
No	209	17	63	20.3	146	15.9

Table 1. Distributions of main characteristics in the whole sample and after stratification by gender.

Bold characters refer to figures significantly different among groups.

**p<0.05; ***p<0.0001*

In both sexes, the age groups 30-44 and 45-54 years were more represented, with a significant prevalence of males in the first group and of females in the second group ($p<0.05$). The distributions between genders were also significantly different for job titles ($p<0.0001$), as support HCWs prevailed among females, whereas physicians prevailed among males.

Table 2 presents the results of the DASS-21 scale in the whole sample as well as after stratification by gender. Females obtained significantly worse results in the three scales, especially in the anxiety scale ($p<0.0001$).

Score	DASS-21 Depression					DASS-21 Anxiety					DASS-21Stress***				
	M		F**		Both	M		F***		Both	M		F*		Both
	N	%	N	%	%	N	%	N	%	%	N	%	N	%	%
1 Normal	**222**	76,6	616	65,6	68,2	**244**	84,1	666	70,9	74,0	**213**	73,4	592	63,0	65,5
2 Slight	33	11,4	115	12,2	12,0	13	4,5	62	6,6	6,1	28	9,7	124	13,2	12,4
3 Moderate	22	7,6	**131**	14,0	12,4	25	8,6	**121**	12,9	11,9	24	8,3	**120**	12,8	11,7
4 Severe	7	2,4	35	3,7	3,4	1	0,3	**39**	4,2	3,3	17	5,9	78	8,3	7,7
5 Extremely severe	6	2,1	42	4,5	3,9	7	2,4	**51**	5,4	4,7	8	2,8	25	2,7	2,7

Table 2. Distribution of DASS-21 scales in the enrolled sample, stratified by gender.

DASS-21: Depression Anxiety Stress Scale

Bold characters indicate the subgroups showing significant differences.

Chi square test: $^{*}p<0.05$; $^{**}p<0.005$; $^{***}p<0.0001$

The results of the IES-R and PSS scales are summarized in Table 3, again in the whole sample and after stratification by gender. Again, on the IES-R, females showed the worst results, with a significant trend across the scale's severity levels ($p<0.0001$), whereas on the PSS scale, no significant difference was observed according to gender.

IES-R scale, score	Whole sample		Males		Females	
	N	%	N	%	N	%
0	441	36	**156**	54	285	30
1	584	47	108	37	**476**	51
2	204	17	26	9	**178**	19
PSS scale, score	N	%	N	%	N	%
1	38	3	7	3	31	3
2	1040	85	236	81	804	86
3	151	12	47	16	104	11

Table 3. Distribution of the IES-R scale in the enrolled sample.

Bold characters indicate subgroups showing significant differences (by gender) according to the standardized residuals.

Chi-square test for trend p<0.0001

As a final step, multinomial logistic regression analysis including covariates such as age, gender, previous COVID-19 infection, job title and having been employed in COVID-19 wards confirmed the importance of gender as a main determinant of DASS-21 results. Younger age groups showed significant associations with higher severity scores in the three DASS-21 domains, whereas assistance in COVID-19 wards showed a significant association with DASS-21 anxiety. Similar associations were observed for the IES-R scale, whereas the PSS scale showed low-grade associations, with borderline statistical significance. In this case, the gender association was inverse to the other scales. The significant results of multivariate analysis are shown in Table 4.

Score	Scales	OR	95% Confidence Interval		*p*
	DASS-21 DEPRESSION				
1	1 (Ref)				
2	*No significant association*				
3	Gender: F vs M	2.06	1.27	3.35	0.01
4	Age: 18-29 *vs* > 55	10.54	1.28	86.98	0.02
	Age: 30-44 *vs* > 55	9.07	1.19	69.21	0.03
5	Gender: F *vs* M	3.01	1.24	7.32	0.01
	DASS-21 ANXIETY				
1	1 (Ref)				
2	*No statistically significant association*				
3	Age: 18-29 vs > 55	2.47	1.29	4.74	0.006
4	Gender: F vs M	13.23	1.80	97.39	0.011
	Assistance to COVID-19 patients	9.73	1.28	73.85	0.028
5	Gender: F vs M	2.47	1.09	5.57	0.030
	DASS-21 STRESS				
1	1 (Ref)				
2	Gender: F vs M	1.63	1.04	2.56	0.035
	Age: 18-29 vs > 55	2.18	1.10	4.33	0.026
3	Gender: F vs M	2.04	1.26	3.30	0.004
4	Gender: F vs M	1.84	1.05	3.22	0.034
5	Age: 18-29 vs > 55	5.24	1.29	21.29	0.020
	IES-R				
0	1 (Ref)				

1	Gender: F vs M	2.58	1.91	3.47	0.00
2	Gender: F vs M	3.92	2.45	6.25	0.00
	Age 30-44 *vs* > 55	2.02	1.16	3.52	0.01
	Assistance to COVID-19 patients	2.84	1.60	5.06	0.000
	PSS				
1	1 (Ref)				
2	Age 30-44 *vs* > 55	2.57	1.007	6.57	0.05
	Past COVID-19: No *vs* Yes	2.13	1.067	4.26	0.03
3	M *vs* F	2.66	1.059	6.66	0.04

Table 4. Significant associations from multinomial logistic regressions-*

DASS-21: Depression Anxiety Stress Scales; *IES-R: Impact of Events Scale-Revised*; *PSS: Perceived Stress Scale.*

** Scale scores were considered dependent variables (level 1-0 set as reference), whereas gender, age group, previous COVID-19, job title, and having provided care in COVID-19 wards were set as covariates.*

Regarding the opinion of workers about the main work content and context elements affecting their wellbeing, table 5 shows the frequencies of answers in descending order. The main elements affecting psychological workers' health were the fear of contagion, organization of work, sense of helplessness in the face of patients' death and workload. In the subgroup of HCWs requiring psychological counseling, similar distributions were found, but higher relevance was observed for "relationships with organization".

Content and context items	Whole sample		Psychological counseling	
	N	%	N	%
Fear of contagion	521	42	22	43
Organization of work	444	36	20	39
Sense of helplessness in face of death of sick person	444	36	19	37
Workload	439	36	18	35
Reconciliation of work and family	361	29	14	27
Change of activity in ward (transformed into a CoVID-19 ward)	321	26	8	16
Fear of not caring adequately	271	22	11	22
Shifts and/or schedules	144	12	4	8
Relationship with organization	143	12	13	25
Change of department	98	8	1	2
Relationship with colleagues	91	7	5	10
Other issues	71	6	3	6
No aspect	20	2	1	2

Table 5. Distributions in descending order of items judged by workers as determinants of their psychological health.

Fifty-one (13M, 38 F) HCWs required clinical psychological counseling. This group was not significantly different in distributions of gender, age, occupational categories, previous COVID-19 and occupational profile from the whole sample (data not shown). Similarly, no statistically significant differences were observed in the distributions of responses to the DASS-21 scale and PSS scales, whereas the group was characterized by a significantly higher prevalence (53 vs 29%, $p<0.005$) in the 1-2 severity score of the IES-R scale.

Of these, 22 workers had only one psychological interview, and 29 were taken in for ongoing psychological support.

Discussion

The present study was performed at the end of the first COVID-19 pandemic phase in a large Italian hospital that was in the epicenter of the pandemic spread in Europe. To better characterize the psychological impact of the pandemic on the psychological sphere, we decided to administer three different scales to investigate behavioral and emotional symptoms in our study group. The DASS-21 scale investigates the levels of depression anxiety and stress, whereas the IES-R scale investigates stress-related symptoms, and the PSS scale allows a rating of perceived stress.

The DASS-21 scale demonstrated slightly higher levels of stress and depression compared to stress, with figures of approximately 30% of the study sample compared to 25%. The three symptoms significantly prevailed among females for depression and stress at the moderate level, whereas for anxiety, the prevalence was significant in the moderate to severe and extremely severe grades.

Regarding the IES-R scale, stress-related symptoms again prevailed significantly among females, particularly at level 2 (clinical significance), where the prevalence was more than double that of males. The results of the PSS scale showed worse results than the previous scale, as only a very slight minority of people showed no symptoms of stress. Such results can possibly be explained by the inherent differences in the structure of the scales themselves and in the greater "sensitivity" of the PSS in registering even mild stress symptoms. In this case, however, no significant difference related to gender was apparent.

In further multivariate analyses, a higher susceptibility of females to symptoms recorded through the DASS-21 scale was confirmed as well as a higher risk for younger (in particular the 18-29 year group) vs older subjects (older than 55 years). Delivering care in a COVID-19 ward was a further risk factor for anxiety symptoms. All such factors (female gender, 30-44 age group and delivering care in a COVID-19 ward) also played a role in stress-related symptoms revealed by the IES-R scale, whereas at the PSS scale, apart from younger age (30-44 years), a significant risk factor resulted in not having suffered a previous SARS-CoV-2 infection or, contrary to what emerged with the other scales, being a male.

Only 51 workers of the sample under analysis accepted the proposal of further clinical psychological counseling, 70% of whom had previously contracted COVID-19. Apart from this, the symptoms shown

at the different scales were quite similar to the rest of the sample group (data not shown). Twenty-two of them received only psychological counseling, whereas 29 were taken in charge for further psychological support.

The main factors of the work environment affecting the workers' wellbeing resulted in decreasing order: fear of contagion, workload, organization and sense of helplessness vs COVID-19 patients. The subset of HCWs who required psychological counseling judged the work similarly but showed the worst relationship with the organization.

This contribution, although with the limitations represented using self-administered questionnaires sent by e-mail and the cross-sectional study design, was conducted on an extremely large population of HCWs (1229 workers). The impact of the pandemic led to the development of stress symptoms, anxiety and depression of varying levels in approximately 30% of HCWs employed in the inpatient wards of COVID-19 patients, with stress symptoms of higher magnitude than anxiety and depression. The obtained results are consistent with literature data on the same topic, with recent reviews highlighting the role of age and gender as main factors affecting the risk of developing symptoms of anxiety, depression, and stress. Most studies agree in showing a higher risk among females and as a function of age (higher in younger subjects) [6][3][15][16][12]. On the other hand, our results appear to disagree with some literature studies [6][12][15] showing a prevalence of psychological effects in nurses and support workers: in our study, no statistically significant association emerged between disorders of the psychological sphere and occupational category. Whereas in other studies [7][17], HCWs attribute perceived fatigue and stress to workload and organization, in our survey, such work-related factors followed in terms of prevalence the fear of contagion.

Our sample showed little inclination to seek psychological support; only 51 workers indeed agreed to psychological counseling, most of whom had previously contracted SARS-CoV-2 infection. We cannot exclude that such an event can have conditioned their option, as it is known that COVID-19 can leave clinical sequelae, including psychological symptoms [18][19][20]. We cannot exclude the possibility of missed workers undergoing psychological counseling or support on their own, outside our hospital, also for privacy reasons. On the other hand, it is possible that most HCWs did not seek psychological support in the full emergency period, which may be explained by the very difficult conditions in which they lived, both personally and professionally.

The concordance between the DASS-21 and IES-R scales shows that they are useful tools that can be used to study pandemic events, while the differences recorded in the description of the extent of symptoms can be explained by differences in the rationale and sensitivity of the different scales in recording the symptoms themselves.

In agreement with literature data, considering the frequency of mental health symptoms occurring in HCWs, mental health-informed accompanying interventions are needed to facilitate coping [12][6][21].

Our results highlight the need for rapid interventions (psychological and organizational) to reduce psychological distress among HCWs, as just proposed in the literature [22]. Given the low propensity for psychological intake evidenced by HCWs, it is important to respect workers' wishes regarding the type, timing, and content of such interventions (e.g., individual psychological counseling with a therapist or a support group with other HCWs, organizational interventions at work with attention to shifts, rests or departmental changes, and incentives to take vacations).

This study was performed in the months immediately following the development of the COVID-19 pandemic; therefore, longitudinal follow-up studies will be necessary to evaluate the trend over time and the developmental trajectories of anxious, depressive and stress-related symptoms in the HCW population, as well as to identify risk and protective factors in the long term.

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