Impact of COVID-19 outbreak on ICU nurses' mental health. An Italian multicenter study

Impatto dell'epidemia di COVID-19 sulla salute mentale degli infermieri di Terapia Intensiva. Uno studio multicentrico Italiano

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ABSTRACT

Aim: The aim of this study was to evaluate variations in ICU nurses ' mental health status over the COVID-19 outbreak by quantifying the extent of symptoms of depression, anxiety and PTSD over time.

Methods: This study was an Italian multicenter prospective cohort study assessing caseness of anxiety, depression and PTSD at 6 and 12 months from the beginning of the COVID-19 outbreak in Italy.

Results: A total of 359 nurses, 233 (64.9%) were males and 126 (35.1%) were females were enrolled. At 6 months the caseness prevalence for anxiety, depression and PTSD were 31.3%, 32.1% and 18.7% respectively. At 12 months the caseness prevalence for anxiety, depression and PTSD were 34.8%, 36.4% and 24.1 % respectively. No statistically significant increase between 6 and 12 months was recorded for the caseness prevalence anxiety (p= .29) and depression (p= .19). However, an increase for the caseness prevalence PTSD at 12 months was observed (p= .049). The significant risk factors for the 221 patients with at least one disorders were age 31-40 (RR= 1.44, IC= 1.25-1.89; p < .001), female gender (RR= 1.31, IC= 1.02-1.51; p=. 042) and had 0-5 years of professional experience (RR= 1.36, IC= 1.02-1.63; p = .031).

Conclusion: The results of our study may provide support for the implementation of some interventions for well-being in COVID-19 outbreak condition.

Key words: Anxiety, Depression, Post-Traumatic stress disorder, Coronavirus, Nurses, Mental health.

RIASSUNTO

Scopo: Lo scopo di questo studio era valutare le variazioni dello stato di salute mentale degli infermieri in terapia intensiva durante l'epidemia di COVID-19 quantificando l'entità dei sintomi di depressione, ansia e PTSD nel tempo.

Metodi: Si tratta di uno studio di coorte prospettico multicentrico italiano che ha valutato la presenza di di ansia, depressione e PTSD a 6 e 12 mesi dall'inizio dell'epidemia di COVID-19.

Risultati: Sono stati arruolati un totale di 359 infermieri, 233 (64.9%) uomini e 126 (35.1%) donne. A 6 mesi dall'inizio della pandemia, la prevalenza di disturbi di ansia, depressione e disturbo da stress post-traumatico era rispettivamente del 31.3%, 32.1% e 18.7%. A 12 mesi la prevalenza per ansia, depressione e PTSD era rispettivamente del 34.8%, 36.4% e 24.1%. Nessun aumento statisticamente significativo tra 6 e 12 mesi è stato registrato per l'ansia (p = .29) o la depressione (p = .19). Tuttavia, è stato osservato un aumento del disturbo da stress post-traumatico a 12 mesi (p = .049). I fattori di rischio significativi per i 221 pazienti con almeno un disturbo, erano un età di 31-40 (RR = 1.44, IC = 1.25-1.89; p < .001), sesso femminile (RR = 1.31, IC = 1.02-1.51; p = .042) e avere un esperienza professionale di 0-5 anni (RR = 1.36, IC = 1.02-1.63; p = .031).

Conclusioni: I risultati del nostro studio possono fornire supporto per l'implementazione di alcuni interventi per il benessere lavorativo nella condizione di epidemia di COVID-19.

Parole chiave: Ansia, depressione, disturbo da stress post-traumatico, Coronavirus, Infermieri, salute mentale.

INTRODUCTION

The COVID-19 pandemic has challenged and, in many cases, exceeded the capacity of hospitals worldwide (Mehta et al., 2021). Healthcare workers (HCWs) have continued to provide care for patients despite exhaustion, personal risk of infection, fear of transmission to family members, illness or death of friends and colleagues, and the loss of many patients. Sadly, nurses have also faced many additional often avoidable sources of stress and anxiety, and long shifts combined with unprecedented population restrictions, including personal isolation, have affected individuals' ability to cope (Mehta et al., 2021).

The frontline health care workers, faced significant challenges to their mental health. For instance, in Italy, doctors and nurses have worked more than 100 h per week. Although Many doctors and nurses were contaminated, the real prevalence of COVID-19 in these professionals is difficult to determine since the disease does not often manifest in people younger than 35 years of age (Sterpetti, 2020). Evidence shows that in similar outbreaks, nurses have already presented the highest levels of occupational stress and resulting distress when compared to other groups of health professionals (Maunder et al., 2006).

Several studies have assessed the mental health outcomes among healthcare workers treating patients exposed to COVID-19.

Healthcare workers are known to be at risk for anxiety, depression, burnout, insomnia, moral distress, and post-traumatic stress disorder (Moss et al., 2016; Poncet et al., 2007). Under usual working conditions, severe burnout syndrome affects as many as 33% of critical care nurses and up to 45% of critical care physicians (Moss et al., 2016; Poncet et al., 2007). Extrinsic organizational risk factors including increased work demands and little control over the work environment and the trauma of caring for patients who are critically ill have been heightened by the COVID-19 pandemic and represent important exacerbating factors for poor mental health among health-care workers.

Following the outbreak of severe acute respiratory syndrome in 2003, healthcare workers reported chronic stress effects for months to years (Maunder et al., 2006).

Among healthcare workers treating patients with COVID-19, a Chinese study reported high rates of depression (50%), anxiety (45%), insomnia (34%), and distress (72%) (Lai et al., 2019).

These findings were supported by a systematic review of 13 studies including more than 33.000 participants (Pappa et al., 2020). Studies from Italy and France reported a high prevalence of depressive symptoms, post-traumatic stress disorder, and burnout; risk factors for adverse psychological outcomes included younger age, female sex, being a nurse, and working directly with patients with COVID-19 (Carmassi et al., 2020; Giusti et al., 2020; Azoulay et al., 2020).

We assumed that the recent COVID-19 outbreak has an impact on nurses. However, the long-term effect on the health of those working in health care remains to be seen.

Thus, since cross-sectional studies collect data only once and over a short period, it is relevant to carry out a longitudinal study which allows us to analyze the change of nurses' mental health status over the COVID-19 outbreak, as well as the change of the impact of each factor associated with mental health outcomes over time.

AIM

The aim of this study was to evaluate variations in ICU nurses ' mental health status over the COVID-19 outbreak by quantifying the extent of symptoms of depression, anxiety and PTSD over time. The secondary aim of this study was to evaluate whether the presence of potential risk factors influenced these symptoms over time.

METHODS

This study is reported following the Strengthening of Reporting in Observational studies in Epidemiology (STROBE) guidance (von Elm et al., 2007).

Study Design

This study was an Italian multicenter prospective cohort study assessing caseness of anxiety, depression and PTSD, by postal questionnaire, among the healthcare workers who have managed and cared for patients with COVID-19. Caseness is the degree to which the accepted standardised diagnostic criteria for a given condition are applicable to a given nurses. A questionnaire study assesses the self-reported symptom burden consistent with a specific disorder but cannot be considered diagnostic. The study protocol was in line with the Declaration of Helsinki, as revised in 2013, and was approved by the institutional reviewer board committee of the Coordinator Center. The questionnaire was not filled in until the consent had been requested and obtained. In addition, data was collected anonymously and the authorization to access the data was given by the director and the manager of each center involved in the study.

Setting

Before undertaking the study, an analysis within the 10 hospitals involved (ASST Lecco, ASST Sette Laghi di Varese, ASST Papa Giovanni XXIII, ASST Lariana, ASST Valtellina e Alto Lario, Presidio Ospedaliero Vimercate, Ospedale Maggiore di Novara, AOU Senese, Ospedale Sant'Elia Caltanissetta and Presidio Ospedaliero Centrale - SS. Annunziata, Taranto)was conducted to analyze the total number of nurses working in COVID-ICU.

We decided to study a convenience sample made of nurses who expressed their willingness to participate in our study. A total sample of 480 nurses had been estimated, across the various ICU, who had managed and were still

managing Covid-patients between 1st March 2020 and 1st March 2021. We contacted the nurses via e-mail contacts and platforms provided by hospitals. A total of 375 nurses (78.1%) were willing to participate in the study.

Participant

In August 2020, the nurses who joined the project had received a first email explaining the study, the questionnaires that would be used and the two phases of development.

The nurses also received a new email with a link and a personal code to be accessed for the completion of two questionnaires at 6 months (September-October 2020) and 12 months (February-March 2021) from the beginning of the COVID-19 outbreak in Italy (1st March 2020). We have identified the beginning of the COVID-19 outbreak with the date of 1st March to simplify the study.

In our analysis we only included nurses who had answered all questions in the demographic questionnaire and both questionnaires (for the evaluation of anxiety, depression and PTSD) administered at 6 and 12 months. Hence, we excluded from the study nurses who had answered only one questionnaire or had given partial information or had not given their consent when completing the online questionnaires. Nurses could withdraw their consent at any point during any phase of the study (by contacting the principal investigators or by returning the survey blank). This resulted in their personal identifying data being purged from the study database, anonymising their record at that point. We have never contacted the nurses who decided not to continue with the study.

Variables

In August 2020 nurses received an e-mail introducing the study and letting them know that the study team was likely to send them other e-mails. Nurses were also asked to provide contact details

for the four principal investigators. Nurses received email questionnaires at 6 and 12 months following 1st March. Each mailing included a demographic questionnaire, the HADS (14 questions, 7 depression and 7 anxiety, each scored ordinally 0–3) and the Post Traumatic Stress Disorder Check List – Civilian version (PCL-C – 17 questions score ordinally 1–5). When there was no response to the first mailing, this was followed by a second postal copy 14 days later. No response after the second mailing was considered a loss to follow up.

A cut-off score ≥ 8 for either HADS anxiety or depression scales defined caseness of the respective condition (Bjelland et al., 2002). We applied HADS boundaries for mild, moderate and severe symptoms to those exhibiting caseness (Snaith & Zigmond, 1994). A PCL-C score ≥ 45 defined PTSD caseness (Andrykowski et al., 1998).

Study size

Study size was based on the total number of nurses meeting inclusion criteria and admitted to the participating units inside the recruitment period.

Quantitative variables

For this analysis the primary outcome was the proportion of nurses meeting predefined thresholds for caseness of anxiety and depression (using the HADS scale) and for PTSD (using PCL-C) at 6 and 12 months following 1st March 2020. Secondary outcome measures were the presence of potential risk factors influenced these symptoms over time, the proportion of individual subjects transitioning these thresholds between time points and the correlation between PTSD, anxiety and depression.

Statistical methods

Statistical analysis was undertaken using R Core v3.4.1 (R core team, 2017). We did not correct for multiple testing. Response was defined as return of a questionnaire with valid written consent. Each instrument was scored in accordance with the author's instructions. Individual responses not meeting the instructions were considered invalid and excluded from further analysis. The proportions of patients meeting the criteria for caseness were calculated for each instrument at each time point. Those meeting the HADS thresholds were further subdivided by symptom severity (mild, moderate, severe).

Population demographics, responses to the individual psychological instruments and change analysis were presented in keeping with the pre-specified data collection plan for the study. The questionnaire assessed demographic variables, such as age, gender, profession, marital status or academic degree, intending to characterise the sample and to test its representativeness of the population. The characteristics of the sample at baseline were summarized by mean and standard deviation (sd) for quantitative variables and by frequency and percentages for qualitative variables.

Variables were included in the analysis only if they were statistically significant at $p < 0.05$.

For the multivariate analysis, logistic regression with backward stepwise elimination by using the likelihood test statistic was used to assess potential predictors of variations in nurses' mental health status over the COVID-19 outbreak by quantifying the extent of symptoms of depression, anxiety and PTSD over time.

For the univariate analysis, a Mann Whitney U test was performed for comparisons between the continuous variables.

Relative risk and the 95% confidence intervals were calculated for each variable analyzed during the follow up. Statistical significance for the identification of independent risk factors was set at $p < 0.05$.

RESULTS

Sample

Questionnaires were sent to a total of 10 hospital involved, for the kind attention of the Charge Nurses and Nurse managers. Each Charge Nurses or Nurse managers sent an e-mail to their nurses. A total of 375 nurses were willing to participate in the study.

The useful and comprehensive questionnaires for our study came from 359 nurses, 233 (64.9%) were males and 126 (35.1%) were females. The mean age was 37.0 years (sd = 9.6 years, range 24–61 years) and more than 50% were unmarried (n = 206, 57.4%). Around 57.9% had a bachelor's degree, 42.1% had a master degree and 4 nurses (1.1%) had a PhD (Table 1).

Outcome data

Figure 1 shows the distribution of HADS anxiety, HADS depression and PCL-C in nurses that provided valid responses at both 6 and 12 months. Percentages denote those with and without caseness. At 6 months the caseness prevalence for anxiety, depression and PTSD were 31.3%, 32.1% and 18.7% respectively. At 12 months the

Figure 1. Caseness distribution against time for the Hospital Anxiety and Depression Score (HADS) and Post-Traumatic Stress Disorder Check List - Civilian (PCL-C) at 6 and 12 months during COVID-19 outbreak.

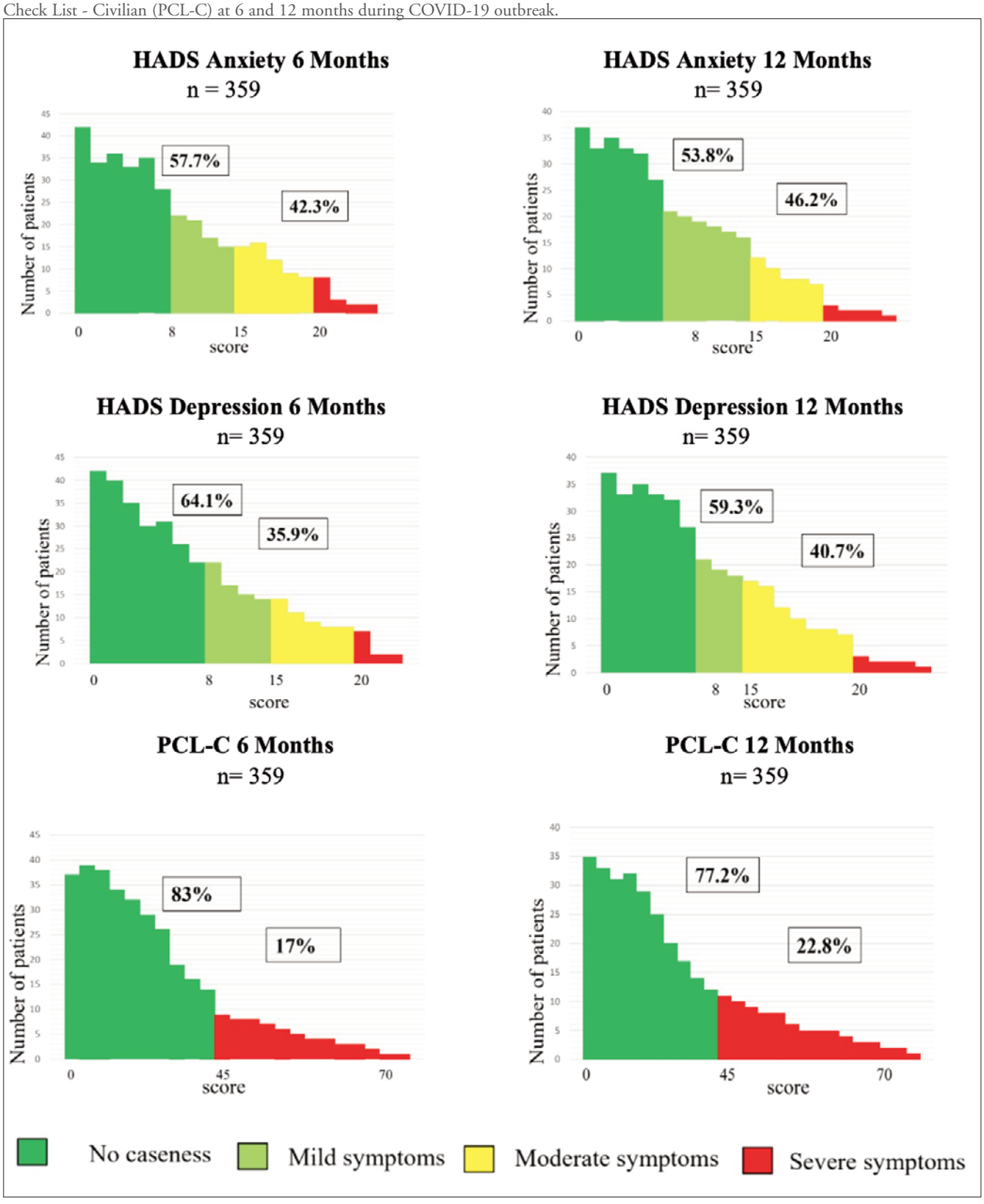

Table 1. Sociodemographic Characteristics of the sample (n= 359).

Variable	N	%
Gender		
Male	233	64.9
Female	126	35.1
Age, range (y)		
24-30	109	30.4
31-40	154	42.9
41-55	65	18.1
> 55	31	8.6
Years of ICU professional experience		
0-1	29	8.1
2-5	78	21.7
6-10	152	42.4
11-20	65	18.1
> 20	35	9.7
Educational Level		
Diploma	89	24.8
Bachelor's degree	208	57.9
Master's degree	151	42.1
PhD	4	1.1
Marital Status		
Single	206	57.4
Married	153	42.6

caseness prevalence for anxiety, depression and PTSD were 34.8%, 36.4% and 24.1 % respectively. However, no statistically significant increase between 6 and 12 months was recorded for the caseness prevalence anxiety (p= .29) and depression (p= .19). A significant increase for the caseness prevalence PTSD at 12 months was observed (RR= 1.34, IC= 1.01-1.81; p= .049).

Whilst population prevalence is largely unchanged between 6 and 12 months across all three instruments, about 10% of respondents who hadn't met the threshold for significant symptoms consistent with anxiety or depression at 6 months fulfilled this cut-off when they responded at 12 months.

Similarly, 4% of responders who met the symptom threshold for PTSD by 12 months, had not when responding at 6 months. Therefore, between one third and one half of the patients meeting the threshold for caseness do so at only one of the two time points.

Change analysis was performed for each instrument, including only those patients who reached the caseness threshold at one but not both time points (Figure 2). The magnitude of this change was significant in the majority of cases: 77% and 78% of patients changed their anxiety/depression score by more than 3 points. A further 81% of patients experienced a change of 5 of more points in their PCL-C score.

Concurrent psychopathology

Of respondents, 52.6% (189/359) met caseness thresholds for at least one of the three conditions at either 6 or 12 months: 40.7% (146/359) met caseness thresholds for more than one psychopathological issue. Meeting caseness thresholds for PTSD alone was the least common (4 participants, 1.1% of those reporting psychopathological

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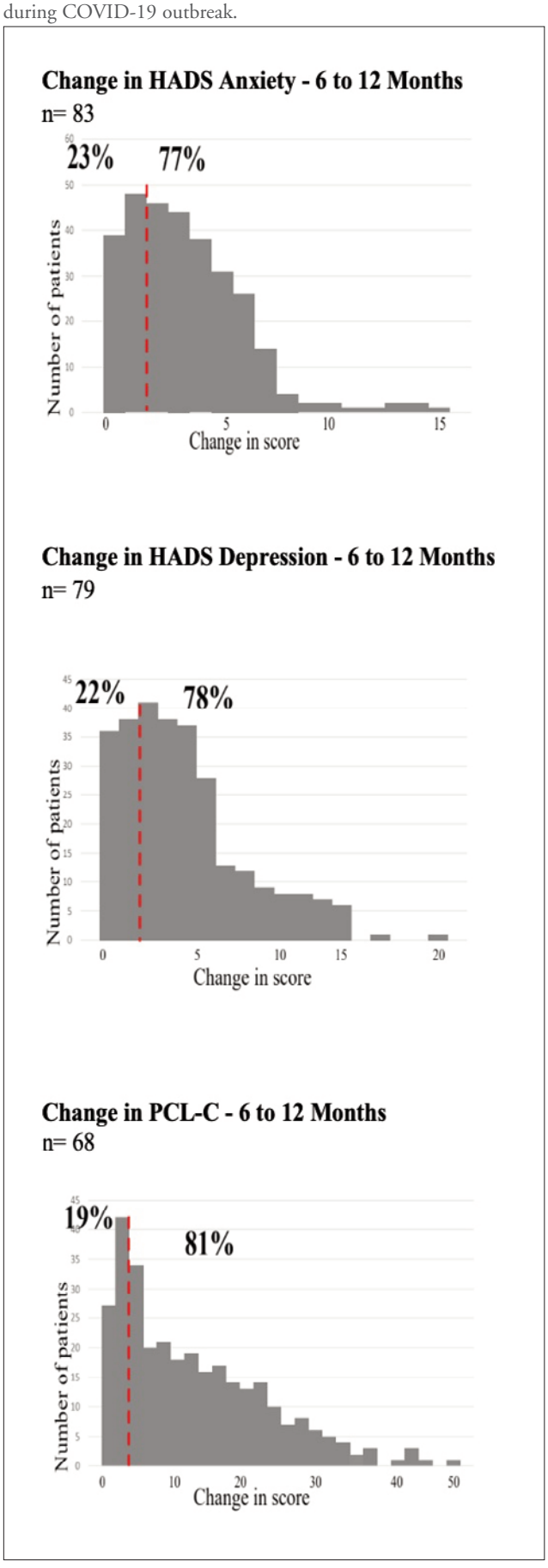

issues). Symptoms of anxiety occurred in 81.9% (181/221) of individuals reporting any psychopathological issue.

Risk factors for depression, anxiety and PTSD

Significant risk factors with relative risk and the 95% confidence intervals are presented.

The significant risk factors for the 221 patients with at least one disorders (61.6%) were age 31-40 (RR= 1.44, IC= 1.25-1.89; p < .001), female gender (RR= 1.31, IC= 1.02-1.51; p=. 042) and had 0-5 years of professional experience (RR= 1.36, IC= 1.02-1.63; p = .031).

No correlation was observed for the educational level, professions or marital status.

We did not observe an increase in anxiety, depression and PTSD in relation to the increase in the chronological age of the nurses.

DISCUSSION

We present a multicenter survey of self-reported anxiety, depression and PTSD in Italian ICU nurses during the COVID-19 outbreak. A high burden of psychopathological issues was reported with over half of respondents meeting caseness thresholds for anxiety, depression or PTSD. A high degree of symptom concurrency between these three conditions was observed. What is particularly interesting is the relatively low incidence of isolated PTSD, occurring in fewer than 4 in 68 individuals reporting any form of suspected psychopathological issue. Conversely, symptoms of anxiety occurred in 81.9% of individuals reporting any psychopathological issue. In addition, we observed a significant increase in PTSD caseness only.

In this cohort, PTSD rarely occurred in isolation, instead it strongly co-occurred with anxiety. Pre-existing anxiety has been demonstrated as a risk factor for developing PTSD in urban populations (Breslau et al., 1991). Conversely, PTSD symptomatology is strongly correlated with anxiety (Nikayin et al., 2016) and co-morbid depression (Paparrigopoulos et al., 2014). It seems logical that anxiety can lead to PTSD. However, these data lack any detail on pre-existing psychological status.

Similarly, and in line with our findings, younger nurses tended to have more stress than older healthcare workers (Purcell et al., 2011). This can be explained by the fact that younger nurses may feel still poorly prepared for their occupational role (Duchscher, 2009; Laschinger et al., 2009) and by the fact that their ideals or values are often in conflict with the tremendous demanding everyday reality at work (Mackintosh, 2006).

This observational study cannot state whether the management of infected patients is directly correlated with the levels of anxiety, depression and PTSD collected. We hypothesize that the only variables which can be directly related to the COVID-19 outbreak and were predictive factors of change, over time, in depression, anxiety and PTSD symptoms were the fear to infect others and the fear to be infected. These fears had already been reported in several studies, both related to the COVID-19 outbreak and previous outbreaks, but they have never been found, consistently over time, in longitudinal studies (Hu et al., 2020; Lee et al., 2020). Nonetheless, a study previously carried out had already suggested that the main source of anxiety in nurses during the COVID-19 outbreak was the fear of becoming infected or unknowingly infecting others, a fear that could be reduced, for instance, by ensuring the availability of adequate personal protective equipment (PPE) (Mo et al., 2020). The fear which is felt by frontline nurses should not be overlooked, especially if we consider that they might express less fear than that they were really experiencing due to social desirability (Hu et al., 2020).

Particular attention should be paid to this phenomenon, considering that previous studies pointed out that an increased level of fear of COVID-19 was associated with decreased job satisfaction, increased psychological stress and increased organizational and professional turnover intentions among frontline nurses (Labrague et al., 2021; Damico et al., 2020).

Limitations

The main limitation of our postal survey is the relatively low response rate that potentially limits the applicability of these results. It is not possible to use these data to infer the reason for non-response, because there would be a potential selection/information bias in the results.

Another limitation of this study relies on the sampling method (convenience sample). This technique can be considered a limitation since it attracts respondents who are already interested in the topic and well engaged. As a consequence, the methodology used might lead to sampling bias and limit the potential generalizability of the findings.

Also, it was not possible for us to state with certainty how many nurses had been working in the Covid-ICU during the study. This is due to the large nursing turnover that has been carried out to deal with the COVID-19 outbreak. We do not know whether the nurses involved changed care settings between the first and the second dispatch of the questionnaires.

This survey was composed only by self-reported questionnaires that are not deepened with clinical and instrumental examinations.

Finally, our study did not include a control group. Due to its absence we cannot affirm a direct relationship between the management of infected patients and the levels of anxiety, depression and PTSD.

CONCLUSION

Nurses' mental health status (symptoms of depression, anxiety and PTSD) varied positively over the COVID-19 outbreak. Among the risk factors that we observed, an age between 31-40 years, the gender and years of professional experience seem to expose nurses to

greater psychological disorders.

The results of our study may provide support for the implementation of some interventions for well-being in COVID-19 outbreak condition. It would be important to offer psychological supports on the most vulnerable categories, and psycho-educational interventions on mental health.

Some potential health policy implications stem from this study. Such implications seem to be particularly relevant for the improvement of healthcare services to cope with successive waves of the COVID-19 outbreak. Firstly, it is crucial that governments systematically identify groups, such as nurses, who are at risk of presenting significant symptoms of depression, anxiety, and/or PTSD providing them with early intervention.

Future research should focus on assessing Italian healthcare workers, with a larger study sample, using the same measurement tool, in order to compare and contrast their depression, anxiety and PTSD symptoms during and after the COVID-19 outbreak. Future studies will have to define the real effect of managing infected patients on HCWs' mental health using control groups.

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REFERENCES

Andrykowski, M.A., Cordova, M.J., Studts, J.L., Miller, T.W. (1998). Posttraumatic stress disorder after treatment for breast cancer: prevalence of diagnosis and use of the PTSD Checklist - Civilian Version (PCL-C) as a screening instrument. *J Consult Clin Psychol*, 66:586–90.

Azoulay, E., Cariou, A., Bruneel, F., et al. (2020). Symptoms of anxiety, depression, and peritraumatic dissociation in critical care clinicians managing patients with COVID-19. A cross-sectional study. *Am J Respir Crit Care Med,* 202:1388–98.

Breslau, N., Davis, G.C., Andreski, P., Peterson, E. (1991). Traumatic events and posttraumatic stress disorder in an urban population of young adults lifetime prevalence of exposure to traumatic events. *Arch Gen Psychiatry,* 48:216–22.

Bjelland, I., Dahl, A.A., Haug, T.T., Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale. *J Psychosom Res,* 52:69–77.

Carmassi, C., Foghi, C., Dell'Oste, V., et al. (2020). PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: what can we expect after the COVID-19 pandemic. *Psychiatry Res*, 292:113312.

Damico, V., Murano, L., Demoro, G., Russello, G., Cataldi, G., D'Alessandro, A. (2020). Sindrome di Burnout tra il personale infermieristico italiano durante l'emergenza COVID 19. Indagine conoscitiva multicentrica [Burnout syndrome among Italian nursing staff during the COVID 19 emergency. Multicentric survey study]. *Prof Inferm,* 73(4):250-257.

Duchscher, J.E. (2009). Transition shock: the initial stage of role adaptation for newly graduated registered nurses. J Adv Nurs, 65:1103–1113.

Giusti, E.M., Pedroli, E., D'Aniello, G.E., et al. (2020). The psychological impact of the COVID-19 outbreak on health professionals: a cross-sectional study. *Front Psychol,* 11:1684.

Hu, D., Kong, Y., Han, Q. (2020). Frontline nurses' burnout, anxiety, depression, and fear statuses and their associated factors during the COVID-19 outbreak in Wuhan, China: a large-scale cross-sectional study. Lancet, 24:100424.

Labrague, L.J., de Los Santos, J.A.A. (2021). Fear of COVID-19, psychological distress, work satisfaction and turnover intention among frontline nurses. *J Nurs Manag,* 29(3):395-403.

Lai, J., Ma, S., Wang, Y., et al. (2019). Factors associated with mental health outcomes among health care workers exposed to coronavirus diseas. *JAMA Netw Open,* 3: e203976.

Laschinger, H.K., Finegan, J., Wilk, P. (2009). New graduate burnout: the impact of professional practice environment, workplace civility, and empowerment. Nurs Econ, 27:377–383.

Lee, J., Hong, J., Park, E. (2020). Beyond the fear: nurses' experiences caring for patients with Middle East respiratory syndrome: a phenomenological study. *J Clin Nurs,* 29:3349–3362.

Mackintosh, C. (2006). Caring: the socialisation of pre-registration student nurses: a longitudinal qualitative descriptive study. *Int J Nurs Stud,* 43:953–962.

Maunder, R., Lancee, W., Balderson, K. (2006). Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg Infect Dis,* 12:1924–1932.

Mehta, S., Machado, F., Kwizera, A., Papazian, L., Moss, M., Azoulay, É., Herridge, M. (2021). COVID-19: a heavy toll on health-care workers. *Lancet Respir Med,* 9(3):226-228.

Mo, Y., Deng, L., Zhang, L. (2020). Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. *J Nurs Manag,* 28:1002–1009.

Moss, M., Good, V.S., Gozal, D., Kleinpell, R., Sessler, C.N. (2016). A critical care societies collaborative statement: burnout syndrome in critical care health-care professionals. A call for action. *Am J Respir Crit Care* Med, 194:106–13.

Nikayin, S., Rabiee, A., Hashem, M.D., et al. (2016). Anxiety symptoms in survivors of critical illness: a systematic review and meta-analysis. *Gen Hosp Psychiatry,* 43:23–9.

Paparrigopoulos, T., Melissaki, A., Tzavellas, E., et al. (2014). Increased co-morbidity of depression and post-traumatic stress disorder symptoms and common risk factors in intensive care unit survivors: a two-year

follow-up study. *Int J Psychiatry Clin Pract,* 18:25–31.
Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V.G., Papoutsi, E., Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun*, 88: 901–07.
Poncet, M.C., Toullic, P., Papazian, L., et al. (2007). Burnout syndrome in critical care nursing staff. *Am J Respir Crit Care Med*, 175: 698–704.
Purcell, S.R., Kutash, M., Cobb, S. (2011). The relationship between nurses' stress and nurse staffing factors in a hospital setting. *J Nurs Manag,* 19:714–720.
R core team. R: A language and environment for statistical computing. Vienna: R Found. *Stat. Comput*; 2017.
Snaith, R.P., Zigmond, A.S. (1994). *The Hospital Anxiey and Depression Scale with the Irritability-depression-anxiety Scale and the Leeds Situational Anxiety Scale: manual.*
Sterpetti, A.V. (2020). Lessons learned during the COVID-19 virus pandemic. J Am Coll Surg, 230:1092–1093.
von Elm, E., Altman, D.G., Egger, M., et al. (2007). The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *PLoS Med,* 2007;4:e296.