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The consequences of the COVID-19 pandemic in nurses in the pre-hospital emergency system: an observational study using the “Screening Questionnaire for Disaster Mental Health” (SQD)

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ABSTRACT

Introduction The COVID-19 pandemic has highlighted the crucial role of nurses and their commitment to their work in facing the situation.

Italy has seen a substantial increase in the number of requests for respiratory assistance, and nurses employed on emergency vehicles have been overwhelmed by the situation, with psychological and physical repercussions such as depression and *Post Traumatic Stress Disease* (PTSD).

The study aims to assess the impact of the pandemic on nurses in the Local Emergency System (SET).

Method Depression and PTSD via “*Screening Questionnaire for Disaster Mental Health*”. The questionnaire was distributed among Italian SET nurses with non-probability sampling between 1 December 2020 and 31 January 2021.

Results A total of 441 Italian nurses participated in the study, with an average age of 43.28 years (SD $\pm$ 9.38) and average working experience in EMS of 11.68 years (SD $\pm$ 7.98). 6.12% of the participants worked in an Operations Centre (CO), 72.34% worked in local emergency services and 21.54% worked in both settings. 17.01% of the sample were at high risk for PTSD and 15.65% for depression.

Discussion The sample mainly consisted of nurses with experience in emergency nursing. The risk of PTSD and depression was within documented ranges.

The analysis by operational setting showed a higher risk of developing PTSD for nurses who carry out CO activities, almost double than those who only work on rescue vehicles. Staff with little experience in SET were found to have a higher risk of developing PTSD and depression.

Conclusion Inexperienced and CO staff were more likely to suffer from PTSD and depression. Plans must be put in place to enable SET staff to overcome and prevent such critical situations.

KEYWORDS Emergency Nurse, pandemic, COVID-19, local emergency, PTSD, depression

INTRODUCTION

The year 2020 was going to be an important one for nurses: the World Health Organisation (WHO) was preparing to celebrate the profession by establishing the Year of the Nurse and Midwife[i]; unfortunately, this year will go down in history as the year of the SARS-CoV-2 pandemic, during which nurses demonstrated the crucial role they play in different care settings. They are necessary figures to ensure an effective, efficient and humane response by the health care system[ii].

In the overall emergency system, health personnel are generally employed more than firefighters and police forces[iii], and they are therefore at a greater risk of stress compared to other emergency services[iv]. Nurses, like other professionals, immediately showed the

commitment necessary to deal with this unprecedented situation[\[v\]](#), but not without repercussions. The high risk of infection and high mortality rate caused by COVID-19 can lead to a strong sense of anxiety among healthcare staff[\[vi\]](#), especially in emergency departments, which may be considered to be at higher risk as patients with suspected COVID-19 infection tend to remain for longer periods of time[\[vii\]](#). In general, reduced work experience can cause depression⁷ and nurses are at increased risk of developing *Post Traumatic Stress Disease* (PTSD)⁷[\[viii\]](#), as close and prolonged contact with a patient can lead to increased fatigue, stress and anxiety⁸[\[ix\]](#).

PTSD can be defined as a psychiatric disorder caused by a dramatic event that is perceived as traumatic[\[x\]](#), which together with depression can generate effects that may last for a prolonged period[\[xi\]](#). In order to reduce the psychological strain caused by the pandemic, interventions by psychologists have been necessary to help workers recover¹¹.

Italy is considered to be the epicentre of the European epidemic due to the high number of people affected by COVID-19 in its early stages [\[xii\]](#). In fact, according to the data provided by the Lombardy Regional Emergency Operations Rooms (Sale Operative Regionali dell'Emergenza Urgenza, SOREU), during the first two epidemic waves (March-April and October-November) there was a significant increase in the number of requests for respiratory assistance, rising from around 200-300 calls per day to peaks of over 1.400 and 1.000 calls respectively for the first and second wave [\[xiii\]](#), generating an emotional and work overload for the staff working in the Local Emergency System (Sistema di Emergenza Territoriale, SET).

At the same time, ambulance staff have had to deal with a high number of people suffering from the disease, sometimes in critical condition, with the constant fear of becoming victims and then carriers themselves[\[xiv\]](#). The risk of contagion for SET emergency staff is amplified by the specific operating setting of rescue vehicles, due to their very limited resources and manoeuvring space[\[xv\]](#); moreover, advanced airway management or ventilation, fundamental in the treatment of people with severe respiratory *distress*, are procedures with high aerosol generation¹⁵ that favour the transmission of the virus.

The use of personal protective equipment (PPE) has been shown to be of considerable importance in protecting against infection and limiting its spread[\[xvi\]](#), but its constant use causes fatigue and stress for rescuers, who may therefore make mistakes¹⁵, thereby increasing the risk of infection both to patients and to themselves¹⁵.

An Italian study conducted by the Italian Society of Emergency-Urgency Medicine (Società Italiana della Medicina di Emergenza-Urgenza, SIMEU)[\[xvii\]](#) analysed how emergency

professionals responded to the stress caused by the epidemic: 2.9% of the sample used benzodiazepines or neuroleptics, 4.4% used analgesics, 5.6% used hypnotics and 18.7% abused alcohol or drugs. The authors, however, state that *burnout* and depression values were still low, mainly associated with young and female staff.

The aim of this study is to evaluate the psychological impact caused by the traumatic events of the pandemic, which affect the professional activity of nurses working in local emergencies.

METHOD

Following a general and specific review of the subject, the “*Screening Questionnaire for Disaster Mental Health*” (SQD) was chosen[\[xviii\]](#). The questionnaire, developed in Japan and aimed at large-scale disaster victims, consists of 12 *items* that can be grouped into two sub-scales: SQD-P for analysing PTSD and SQD-D for depression¹⁸. Given the impact that the pandemic has had on a global level[\[xix\]](#) and its consequences on the mental health of healthcare professionals^{8,9}, the authors of this study decided to use the aforementioned instrument to analyse the repercussions of the recent events in the local emergency nurse population.

The criteria for inclusion in the study can be summarised as follows:

- being a nurse;
- working in local emergency and/or CO;
- working in Italy.

The questionnaire was reproduced through “Google Forms” and shared between 1 December 2020 and 31 January 2021, initially circulated among the members of the Italian Society of Local Emergency Nurses (Società Italiana di Infermieri di Emergenza Territoriale, SIIET) and then, through non-probabilistic “snowball” sampling[\[xx\]](#), participants were asked to involve their contacts working in the local emergency sector, even outside the SIIET. The results were analysed using Microsoft Excel.

The structure of the questionnaire includes 2 sections:

1. socio-demographic characteristics of the participants (5 multiple choice items);
2. SQD questionnaire (12 yes/no items, yes =+1; no =0).

RESULTS

Table 1. Sample characteristics

Tabella 1. Caratteristiche del campione

Variabile	N	(%)
Campione	441	
Età media	43,28	
Posizione attuale		
Soccorso territoriale	319	72,34
Centrale Operativa	27	6,12
Entrambi	95	21,54
Socio SIJET		
Sì	244	55,33
No	197	44,67
Anni di esperienza		
Esperienza media (anni)	11,68	
0 - 2	61	13,83
3 - 5	79	17,91
6 - 10	77	17,46
11 - 15	82	18,59
> 15	142	32,20
Regione di provenienza		
Abruzzo	1	0,23
Basilicata	10	2,27
Calabria	0	0,00
Campania	15	3,40
Emilia Romagna	130	29,48
Friuli Venezia Giulia	1	0,23
Lazio	6	1,36
Liguria	36	8,16
Lombardia	31	7,03
Marche	28	6,35
Molise	0	0,00
Piemonte	5	1,13
Puglia	35	7,94
Sardegna	41	9,30
Sicilia	0	0,00
Toscana	58	13,15
Trentino Alto Adige	2	0,45
Umbria	0	0,00
Valle d'Aosta	15	3,40
Veneto	27	6,12

441 SET nurses participated in the study. Sociodemographic data and sample characteristics are described in Table 1. The average age of the sample was 43.28 years (SD $\pm$ 9.38), average work experience in the SET was 11.68 years (SD $\pm$ 7.98). 6.12% (N=27) of the participants work in an Operations Centre (CO), 72.34% (N=319) work as ambulance and/or paramedic staff and 21.54% (N=95) work in both *settings*.

61 (13.83%) nurses had between 0 and 2 years of experience, 79 (17.91%) between 3 and 5 years, 77 (17.46%) between 6 and 10 years, 82 (18.59%) between 11 and 15 years, and 142 (32.20%) over 15 years.

As shown in Table 1, the origin of the sampled population is 1 (0.23%) from Abruzzo, 10 (2.27%) from Basilicata, 15 (3.40%) from Campania, 130 (29.48%) from Emilia-Romagna, 1 (0.23%) from Friuli Venezia Giulia, 6 (1.36%) from Lazio, 36 (8.16%) from Liguria, 31 (7.03%) from Lombardy, 28 (6.35%) from Marche, 5 (1.13%) from Piedmont, 35 (7.94%) from Apulia, 41 (9.30%) from Sardinia, 58 (13.15%) from Tuscany, 2 (0.45%) from Trentino Alto Adige, 15 (3.40%) from Valle D'Aosta and 27 (6.12%) from Veneto. No responses were received from nurses working in the SETs of Calabria, Molise, Sicily and Umbria.

55.33% of the sample (N=244) were SIIET members, 45.67% (N=197) were not.

Table 2 represents the independently analysed responses to the questionnaire.

Table 2. Answers to the “Screening Questionnaire for Disaster Mental Health”

Tabella 2. Risposte ai quesiti del Screening Questionnaire for Disaster Mental Health

	Si (%)	No (%)
D1. Ha notato qualche modificazione del suo appetito?	165 (37,41)	276 (62,59)
D2. Ha la sensazione di stancarsi facilmente o di sentirsi sempre stanco?	289 (65,53)	152 (34,47)
D3. Ha difficoltà ad addormentarsi o a dormire di notte?	210 (47,62)	231 (52,38)
D4. Nel sonno, ha incubi sull'evento?	57 (12,93)	384 (87,07)
D5. Si sente depresso?	92 (20,86)	349 (79,14)
D6. Si sente irritabile?	284 (64,40)	157 (35,60)
D7. Avverte di essere ipersensibile a piccoli rumori o tremori?	95 (21,54)	346 (78,46)
D8. Evita luoghi, gente, argomenti che si riferiscono all'evento?	178 (40,36)	263 (59,64)
D9. Pensa all'evento anche non volendo?	152 (34,47)	289 (65,53)
D10. Ha difficoltà nel provare piacere in situazioni per le quali prima provava piacere?	114 (25,85)	327 (74,15)
D11. Si sente agitato quando qualcosa le ricorda l'evento?	113 (25,62)	328 (74,38)
D12. Avverte di fare uno sforzo per provare a non pensare all'evento, o nel tentare di dimenticarlo?	112 (25,40)	329 (74,60)

The questionnaire design allows to analyse the risk of PTSD and depression separately. By using the SQD-P and the aggregated analysis of questions D3, D4, D6, D7, D8, D9, D10, D11, D12 for each of the participants, the risk of PTSD can be stratified. 277 (62.81%) nurses scored between 0 and 3, thus at a low risk of PTSD, according to the authors of the questionnaire; 89 (20.18%) scored between 4 and 5, therefore they may be moderately

affected by PTSD; 75 (17.01%) scored between 6 and 9 with a high probability of experiencing PTSD.

Similarly, we can determine the risk of depression of the sample with the SQD-D by aggregating affirmative answers to questions D1, D2, D3, D5, D6, D10. 372 (84.35%) had a score between 0 and 4, with a low risk of depression, while 69 nurses (15.65%) had a score between 5 and 6, with a probable risk of developing depression.

We also wanted to verify the incidence that the operative *setting* may have: therefore, the answers given by those who work on rescue vehicles, in CO or in both contexts were analysed separately (Table 3).

Table 3. Impact of the operational setting in SQD-P and SQD-D

Tabella 3. Incidenza setting operativo in SQD-P e SQD-D

	SQD-P			SQD-D	
	0 - 3 (%)	4 - 5 (%)	6 - 9 (%)	0 - 4 (%)	5 - 6 (%)
Emergenza Territoriale	196 (61,44%)	66 (20,69%)	57 (17,87%)	265 (83,07%)	54 (16,93%)
Centrale Operativa	13 (48,15%)	6 (22,22%)	8 (29,63%)	21 (77,78%)	6 (22,22%)
Entrambe	68 (71,58%)	17 (17,89%)	10 (10,53%)	86 (90,53%)	9 (9,47%)

The specific analysis of the SQD-P addressed to nurses working only in local rescue allowed us to determine that 196 (61.44%) obtained a score lower or equal to 3, 66 (20.69%) between 4 and 5 and 57 (17.87%) higher or equal to 6.

For the SQD-D 265 (83.07%) scored between 0 and 4, 54 (16.93%) between 5 and 6.

The same approach was used for those working in CO: for the SQD-P, 13 (48.15%) scored between 0 and 3, 6 (22.22%) between 4 and 5, and 8 (29.63%) between 6 and 9. For the SQD-D, 21 (77.78%) scored between 0 and 4 and 6 (22.22%) scored between 5 and 6.

Finally, the analysis was aimed at those who work both in emergency vehicles and in Cos: it was found that the risk of PTSD is low (0-3) for 68 of them (71.58%), for 17 (17.89%) it is moderate (4-5), and for 10 (10.53%) it is high (6-9). For the same sample, 86 (90.53%) have a low probability of experiencing depression (0-4), 9 (9.47%) have a high probability of experiencing depressive symptoms (5-6).

The last analysis deals with the risk of PTSD and depression related to work experience in the SET, respectively 0 – 2 years, 3 – 5 years, 6 – 10 years, 11 – 15 years and over 15 years (Table 4).

Table 4. Correlation between experience and PTSD/depression

Tabella 4. Correlazione tra esperienza e PTSD/depressione

Esperienza in anni	0 – 2 (%)	3 – 5 (%)	6 – 10 (%)	11 – 15 (%)	>15 (%)
	61 (13,83)	79 (17,91)	77 (17,46)	82 (18,59)	142 (32,20)
SQD-P Lieve	35 (57,38)	55 (69,62)	40 (51,95)	57 (69,51)	90 (63,38)
SQD-P Moderata	10 (16,39)	15 (18,99)	23 (29,87)	15 (18,29)	26 (18,31)
SQD-P Severa	16 (26,23)	9 (11,39)	14 (18,18)	10 (12,20)	26 (18,31)
SQD-D Poco Probabile	47 (77,05)	73 (92,41)	63 (81,82)	73 (89,02)	116 (81,69)
SQD-D Probabile	14 (22,95)	6 (7,59)	14 (18,18)	9 (10,98)	26 (18,31)

With regard to the 61 (13.83%) nurses with 0 – 2 years of experience, 35 (57.38%) had a slight risk of PTSD, 10 (16.39%) a moderate risk, 16 (26.23%) a severe risk; for the same sample, 47 (77.05%) had a low risk of developing depression, 14 (22.95%) a greater risk. For the 79 (17.91%) with 3 – 5 years of experience: 55 (69.62%) are at low risk for PTSD, 15 (18.99%) at moderate risk and 9 (11.39%) at high risk for PTSD; for 73 (92.41%) the risk of depression is low, for 6 (7.59%) it is high. Among the 77 (17.46%) nurses with 6 – 10 years of experience, 40 (51.95%) had a slight risk of PTSD, 23 (29.87%) a moderate risk, 14 (18.18%) a severe risk; for the same subgroup, 63 (81.82%) had a low probability of developing depression, 14 (18.18%) a higher probability. Among the 82 (18.59%) nurses with 11 – 15 years of experience, 57 (69.51%) are at low risk for PTSD, 15 (18.29%) at moderate risk and 10 (12.20%) at high risk for PTSD; for 73 (89.02%) the risk of depression is low, for 9 (10.98%) it is high. Finally, among the 142 (32.20%) nurses with more than 15 years of experience, 90 (63.38%) had a slight risk of PTSD, 26 (18.31%) a moderate risk, the other 26 (18.31%) had a severe risk; for the same sub-sample, 116 (81.69%) had a low probability of developing depression, 26 (18.31%) had a higher probability.

DISCUSSION

The aim of the study is to highlight any actual or potential situations of stress or depression among nurses employed in SETs during this historical period represented by the COVID-19 pandemic.

The first element that we want to highlight is the average working experience in SETs of the sample: 11.68 years ($DS \pm 7.98$). This is essential because, according to Benner's

theories[xxi], it allows us to state that the personnel belonging to the emergency system are generally experienced, and therefore able to understand the situation and modulate their behaviour accordingly[xxii]. Specifically, 50.79% have more than 10 years of experience and can be defined as moderate experts (10 - 15 years of experience) or advanced experts (>15 years of experience)[xxiii].

Analysing the entire sample, 17.01% (N=75) were at high risk of PTSD, which is in line with documented findings³[xxiv][xxv][xxvi], where between 11% and 21% of first responders experienced symptoms indicative of PTSD, with a similar incidence for ICU nurses[xxvii][xxviii]; but, according to Luftman et al.[xxix], staff working in SETs are almost twice as likely to be at risk as those working in the ICU or operating theatre. As for depression, symptoms were present in 15.65% (N=69) of the sample; similar values were obtained in a systematic review comparing 27 international studies²⁴. This data is actually almost encouraging when compared with other studies where depression was present in between 28.7% and 46.5% of critical care nurses²⁷[xxx][xxxi].

The specific analysis by operating *setting* showed that those who work in COs have almost double the values for developing PTSD compared to those who work in rescue vehicles (29.63% vs. 17.87%). This value is also higher when compared to other studies²⁶[xxxii], where an incidence of PTSD between 11.3% and 17.6% was found among phone and vehicle operators. Depressive symptoms also affect COs more (22.22%) than other SET members and Lilly et al.³² also found similar values.

Reasons that may contribute to COs' stress include working alone during night and weekend shifts, heavy workloads that may make it difficult to take a break, and conflict between COs and staff working on the vehicles.[xxxiii].

In the last analysis, the risk of PTSD and depression was correlated with experience in SET. The stratification of the sample was performed by considering 5 categories: beginners (0 - 2 years)[xxxiv], competent (3 - 5)³⁴, slightly experienced (6 - 10) [xxxv], moderately experienced (11 - 15)³⁵, highly experienced (>15 years)³⁵. From this subdivision we found that 32.20% (N=142) of the sample were staff with more than 15 years of experience in SET, i.e. highly trained nurses who have developed fundamental *leadership* skills in rescue management[xxxvi].

The novice group experienced more psychological issues: 26.23% (N=16) developed severe PTSD and 22.95% (N=14) developed depression. Carmassi et al.¹⁴ indicate that young people or those with little work experience are usually more affected by stress-related symptoms.

The groups with the lowest risk of PTSD and depression were the competent (11.39% - 7.59%) and the moderately experienced (12.20% - 10.98%). The risk of PTSD and depression for nurses in the newly experienced and advanced expert groups was between those mentioned above: among the newly experienced 18.18% (N=14) were at risk for PTSD and 18.18% (N=14) for depression; among the advanced experts 18.31% (N=26) were at risk for PTSD and 18.31% (N=26) for depression. This fluctuating pattern of psychological problems among the various experience groups could adversely affect professionals by causing an increase in absenteeism, loss of productivity, and above all by reducing the quality of direct patient care with a consequent decrease in positive *outcomes*³¹.

In order to address these issues, it may be helpful to increase the resilience of professionals^[xxxvii]^[xxxviii], and nursing managers and coordinators should work to establish training to increase the resilience of nurses^[xxxix]^[xl].

CONCLUSION

This study is not free from limitations: the authors decided to omit the analysis of gender (male, female) since the relationship between gender and emotional states is already widely documented¹⁴¹⁷²⁶; therefore, only the repercussions on SET nurses related by their work and amplified by the pandemic were analysed in this study.

Another limitation was the lack of response from nurses working in some regions: therefore, the results obtained do not provide a complete picture of the situation in Italy.

The SET is composed of both rescue crews and COs who operate the entire organisational structure necessary for carrying out missions. The values obtained for PTSD and depression reflect those documented before the pandemic, so it is conceivable that SET personnel are physiologically prepared to withstand highly emotional situations. One might think that only those who directly experience the sometimes-tragic work of paramedics are victims of PTSD and depression, but often COs also suffer the consequences of the stress of those moments when they have to act quickly. In fact, in this study, COs were found to be the most susceptible to PTSD and depression. There are few articles dealing with this topic and a German study has recently been published on the subject, which quantitatively describes how COs may be at risk²⁶.

As already described in the articles mentioned⁷¹⁴, novice staff are shown to be the most psychologically distressed in this study too, so it is essential to implement plans to enable staff to overcome such critical situations³⁹⁴⁰. We should deepen and expand the study in order to take timely action and minimise the risks of PTSD and depression among SET

professionals.

INTEREST

The authors declare that they have no conflicts of interest associated with this study.

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