

## Post-traumatic stress disorder of the critical care nurses during the COVID-19: a cross-sectional study

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### Abstract

**Background:** The COVID-19 pandemic has a negative effect on critical care nurses' mental health. **Aim:** This study aimed to assess the level of post-traumatic stress disorder (PTSD) among the critical care nurses caring for patients with COVID 19 and evaluate the stress factors that affect them. **Study design and Methods:** A descriptive cross-sectional study was conducted in the intensive care and emergency units at Assiut University Hospital from the period of August 2020 to November 2020; 118 critical care nurses completed the questionnaire via an online survey. **Results:** Among the participating nurses (47.5%) were reported moderate level of post-traumatic stress disorder symptoms, and (39.0%) were reported severe level of PTSD symptoms. At P=0.05, there was a positive significant correlation between PTSD and workload, COVID 19 patient death, conflict with physician, lack of competency, and fear of infection among participant nurses ( $r = .370^{**}$ ,  $r = .268^{**}$ ,  $r = .268^{**}$ ,  $r = .265^{**}$ ,  $r = r = .272^{**}$ ,  $r = .277^{**}$ ) respectively. **Conclusion:** The rate of post-traumatic stress disorder was higher among critical care nurses caring for patients with COVID-19. **Recommendations:** We recommended further study to investigate the impact of the COVID-19 on mental health of critical care nurses and educate them about PTSD.

**Keywords:** COVID-19, Critical care nurses & Post-traumatic stress disorder

### Introduction

The coronavirus variations result in several infectious diseases; have plagued individuals all over the world. Starting with severe acute respiratory syndrome (SARS) in 2003, Middle East respiratory syndrome (MERS) in 2012, and coronavirus disease 2019 (COVID-19) in late 2019. The World Health Organization (WHO) proclaimed COVID-19 a global epidemic as individuals continued to get infected with it. As of May 24, 2021, the number of confirmed cases of COVID-19 worldwide was over 165 million, with around 3.4 million individuals dying from COVID-19. While in Egypt, there have been 382,194 confirmed cases of COVID-19 with 21,639 deaths (Kang & Shin 2020; Lee & Hong, 2021).

The COVID-19 has a similar transmissibility to other infectious diseases, but no treatment has been produced to date; as a result, it continues to infect people at an increasing rate. In order to prevent the spread of COVID-19, "social distancing" should be implemented. Health-care team is essential resources for ongoing and safe patient care, and for outbreak containment (Kang, Shin 2020 & Lu et al, 2020).

The health care team especially critical care nurses, play an important role in diagnosing and treating patients with COVID-19, and they face a high risk of infection and, thus transmit infection to others.

Consequently, health care teams confronted with critical situations as the COVID-19 pandemic, which raises the risk of psychological distress, and that may extend to mental health symptoms mostly post-traumatic stress disorder. The psychological impact of the COVID-19 pandemic on healthcare team is a specific challenge for healthcare systems around the world (Boyras & Legros 2020; Jiang et al, 2020 & Lai et al, 2020 & Sun et al, 2020).

Post-traumatic stress disorder develops after exposure to traumatic event that is unrelated to their past experiences. When nurses in intensive care units face a life-threatening situation as in the COVID-19 pandemic, their fear and anxiety levels increase, activating the body's stress response, and PTSD symptoms appears. There is two to three times more risk to develop PTSD among nurses dealing with patients with COVID 19 than those who are not deal with these patients. Because they care for patients in their most critical illness stage, critical care nurses are more vulnerable to post-traumatic stress symptoms. Post-traumatic stress disorders symptoms involve sleep deprivation, avoidance, depression, anxiety and fear of patients and they can lead to false decisions, medication errors and may negatively effect on patient care (Circenis & Millere, 2011; Missouriidou, 2017; Benfante et al, 2020; Liu et al, 2020; Lee & Hong, 2021).

### Significance of the study

Its mentioned in many references that increased COVID-19 infection rates, high mortality rate, workload, lack of resources for patients care, lack of personal protection equipment, lack of COVID-19 guideline, physical and emotional exhaustion, risk of infection or transmission of infection to family members, anxiety, isolation and feelings of being unsupported may all lead to nurses' post-traumatic stress disorder. Gender, age, marital status, coping techniques, social support, previous clinical experience, and duty hours can all influence the level of PTSD symptoms (Aminizadeh et al, 2013 & Mealer et al, 2017 & Ning et al, 2017; Hosseinijad et al, 2019; Choi, Bae, 2020 & Lai et al, 2020 & Liu et al, 2020 & Sun et al, 2020, Heesakkers et al, 2021 & Marcomini et al, 2021). Therefore, it is important to assess the level of post-traumatic stress disorder among the critical care nurses caring for patients with COVID 19 and evaluate the stress factors that affect them.

### The aim of the study

The study aimed to assess the level of post-traumatic stress disorder among the critical care nurses caring for patients with COVID 19 and evaluate the stress factors that affect them.

### Research questions

- What is the level of post-traumatic stress disorder among the critical care nurses caring for patients with COVID 19?
- What are stress factors associated with occurrence of post-traumatic stress disorder among the critical care nurses caring for patients with COVID 19?
- Is there a correlation between post-traumatic stress disorder and perceived stress factors for critical care nurses?

### Material and Methods:

#### Research design and Setting:

A descriptive cross-sectional study was conducted in emergency department, and intensive care units (ICUs) that assign to register patients who are suspected or positive for COVID-19 (namely General ICU, Trauma ICU) at Assiut University Hospital.

#### Study sample:

A convenience sampling of 130 critical care nurses who caring for patients with COVID-19 were asked to participate in the study.

The questionnaire distributed via online and 118 of the nurses completed it.

#### Tools:

Two tools were used in this study

#### Tool one: Post-traumatic Stress Disorders (PTSD) questionnaire:

This tool consists of two parts. **Part one:** The characteristics and profile of the subjects include

gender, age, occupation, marital status, educational level, previous experience, past medical history, and daily duty hours, living with a risk person for acquiring infection, interest in following COVID-19 pandemic updates and source of information. **Part two:** The 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), Posttraumatic Stress Disorder Checklist (PCL-5) which was developed by (Blevins et al, 2015) and the researchers adapted the scoring system of this questionnaire. The PCL-5 is a self-report questionnaire, including 20 items that measure presence and severity of symptoms of post-traumatic stress syndrome. Responses were rating utilizing five points Likert Scale ranging from (1) Not at all, (2) A little bit, (3) Moderately, (4) Quite a bit, (5) Extremely. The total score of all 20 items ranged between 20 and 100. A score of 20 to less than 30 was identified as no PTSD symptoms; a score of 30 to less than 40 was identified as mild level of PTSD symptoms; a score of 40 to less than 55 was identified as moderate level of PTSD symptoms; and a score of 55 to 100 was identified as high severity PTSD symptoms.

#### Tool two: Stress factors assessment tool

The researchers developed this tool based on the national and international related literature (Circenis et al, 2011 & Benfante et al, 2020, Kisely et al, 2020 & Lai et al, 2020). Fear of infection, workload, dying of COVID 19 patients, conflict with nurses, conflict with physicians, lack of support, lack of supplies, lack of COVID 19 treatment guidelines, and lack of competency were all listed as perceived stressors that increased the risk of developing PTSD symptoms. The nurses were instructed to read each factor and respond with a yes or no.

#### Methods:

The researchers were conducted the study after reviewing the literatures related to the aim of the study as nursing textbooks and scientific medical and nursing journals to develop the study tools and determined the study samples.

#### Ethical Considerations:

The study was approved by the Scientific Research Ethical Committee of the Faculty of Nursing at Assiut University. The participants nurses were then given written informed consent for their participation in the study by selecting the box "Yes, I agree and this is my informed consent" on the online form. To maintain the confidentiality of the participant nurses in the study, they were not asked to write their name on the questionnaires and they were informed about anonymity, lack of risk, voluntary participation, the rights to refuse or withdraw during the study without giving any causes.

#### Tool validity:

The data collection tools were sent to panel of five experts in nursing science for face and content validity evaluation. The panel of five professors in the specialty of critical care and emergency nursing and psychiatric nursing at Assiut University. They reviewed the tools for relevance, clarity, and applicability. Some modifications were done depended on their opinions.

**Tool reliability:**

Cronbach's alpha coefficient was used to examine the tools' internal consistency and stability (0.922, 0.923, respectively).

**Pilot study:**

A pilot study was conducted in Jun 2020 after the permission was obtained from administrative staff of Assiut University hospital. The study subjects involved in the pilot were excluded from the main study sample. The pilot study assisted to determine the clarity of questions and the time required to complete the study tools. They took around 10 minute to complete the tools.

**Data Collection**

- The researchers tested the accuracy of translation by translating the study tools into Arabic and then back into English.
- The research explained the study nature and aim to all participant nurses and given them opportunity to ask any questions.
- The online questionnaire was created using Google Forms and emailed to the nurses via their professional email addresses or Whats App.
- To avoid missing data, the researchers instructed all participants to answer all questions.
- Data was collected by the researcher from the period of August 2020 to November 2020.

**Statistical design**

The researcher's revised, coded and entered the collected data utilizing computer software PC. The statistical analysis was done utilizing the Statistical Package for Social Sciences (SPSS) Version 22. The data were presented utilizing descriptive statistics in the form of frequency and percentage for qualitative variables. The chi-square test was utilized to determine the participated nurses' interest about COVID-19 updates and their source of information, perceived stress factors associated with occurrence of PTSD symptoms and Post Traumatic Stress disorder score of the study sample. Pearson's correlation ( $r$ ) was utilized to examine the relationship between Post-Traumatic Stress syndrome score and the study sample characteristics. Correlation coefficient test was also utilized between PTSD and perceived stress factors associated with occurrence of PTSD. A significance level of  $<0.05$  was utilized to set statistical significance.

**Results:****Table (1): The study sample characteristics and profile (n=118)**

Items	No.	%
<b>Gender</b>		
▪ Female	75	63.6
▪ Male	43	36.4
<b>Age Group</b>		
▪ Less than 25 year	51	43.2
▪ From 25-30 years	51	43.2
▪ More than 30 years	16	13.6
▪ Mean±SD(range)	<b>25.78±3.19</b>	
<b>Education</b>		
▪ Doctoral degree in Nursing	2	1.7
▪ Master degree in Nursing	11	9.3
▪ Bachelor of Science in Nursing	78	66.1
▪ Nursing Institute	23	19.5
▪ Nursing Diploma	4	3.4
<b>Level of experience</b>		
▪ ≤ 5 years	89	75.4
▪ More than 5 years	29	24.6
<b>Position/ job / occupation</b>		
▪ Register Nurse	65	55.1
▪ Intern Nurse	17	14.4
▪ High Institute Nurse	29	24.6
▪ Supervisor	7	5.9
<b>Marital status</b>		
▪ Married	35	29.7
▪ Single	83	70.3
<b>Do you live with family risk for infection</b>		
▪ Yes	86	72.9
▪ No	32	27.1
<b>Chronic illness</b>		
▪ Yes	8	6.8
▪ No	110	93.2
<b>Nurse to patient ratio</b>		
▪ 1:1	15	12.7
▪ 1:2	29	24.6
▪ 1:3	21	17.8
▪ 1:4	15	12.7
▪ 1: More than 5	38	32.2

**Table (2): The participated nurses' interest about COVID-19 updates and source of information (n=118)**

Items	No.	%
<b>Follow up COVID-19 updates</b>		
▪ Interested	95	<b>80.5</b>
▪ Not interested	23	19.5
<b>Source of information</b>		
▪ Any internet websites	9	7.6
▪ Colleagues	7	5.9
▪ WHO website	43	<b>36.4</b>
▪ MOH	4	3.4
▪ Both WHO & MOH	11	9.3
▪ Directors	9	7.6
▪ All	35	29.7

WHO: World Health Organization

MOH: Ministry Of Health

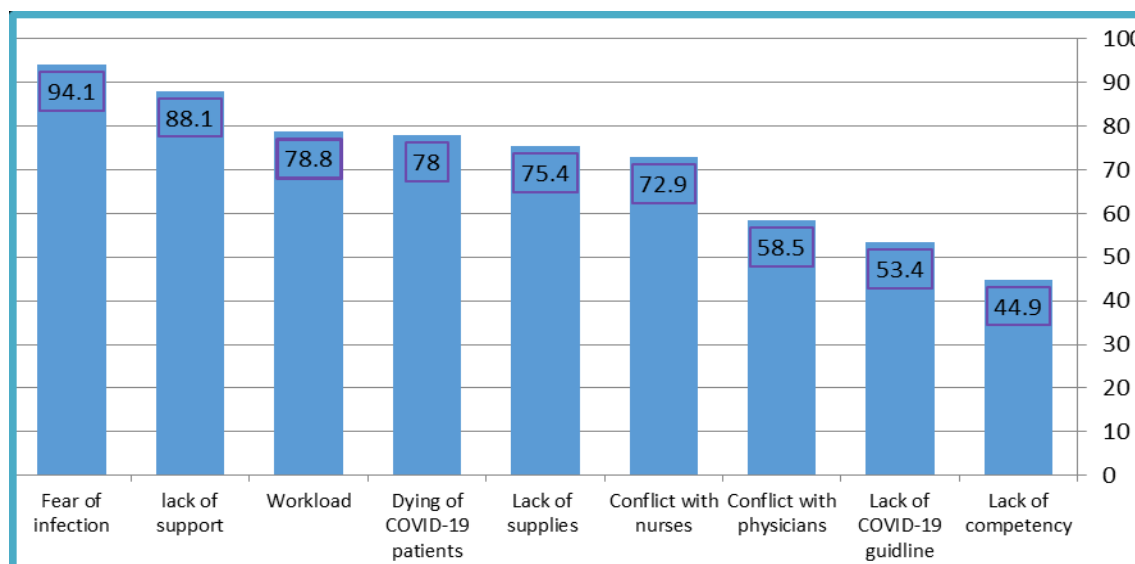


Figure (1): Perceived stress factors associated with occurrence of PTSD among participated nurses caring for patients with COVID 19 (n=118)

Table (3): Post Traumatic Stress Disorder symptoms score of the study sample (n=118)

PTSD		
Mean ± SD (Min-Max)	54.93±16.86 (20-99)	
<b>PTSD categories</b>	<b>N</b>	<b>%</b>
▪ No PTSD symptoms (20-< 30)	6	5.1
▪ Mild PTSD symptoms (30- < 40)	10	8.5
▪ Moderate PTSD symptoms (40- < 55)	56	<b>47.5</b>
▪ High Severity PTSD symptoms (55- 100)	46	<b>39.0</b>

Table (4): Correlation Co- efficient between PTSD and the study sample characteristics

Correlations	PTSD	
	R	P
Age	-0.110	0.235
Gender	0.113	0.223
Marital status	-0.018	0.845
Position	0.054	0.565
Education	-0.167	0.071
Years of experience	-0.044	0.636
Nurse to patient ratio	<b>.198*</b>	0.031*

\*Statistically Significant Correlation at P. value <0.05

Table (5): Correlation Co- efficient between PTSD and perceived stress factors associated with occurrence of PTSD

Perceived stress factors	PTSD	
	R	P
Workload	.370	<b>0.000**</b>
Dying of COVID 19 patient	.268	<b>0.003**</b>
Conflict with nurses	.268	<b>0.003**</b>
Conflict with physician	.265	<b>0.004**</b>
Lack of social support	0.170	0.066
Lack of COVID 19 guidelines	0.151	0.103
Lack of competency	.272	<b>0.003**</b>
Fear of infection	.277	<b>0.002</b>

\*\*Statistically Significant Correlation at P. value <0.05

**Table (1):** Regarding the study sample characteristics, among the 130 critical care nurses asked to participate, 118 (90.76%) respondents completed the questionnaire. The participant nurses were predominately female (75 [63.6%]) with an average age of (25.78±3.19) years old. More than half of the study sample (78 [66.1%]) have a Bachelor of Science in Nursing while two-thirds of them (89 [75.4%]) had less than 5 years of experience. A total of 65 participants (55.1%) were worked as a registered nurse. The highest percentage of critical care nurses involved in the study are single but live with risky persons (70.3%, 72.9 %) respectively. Only 6.8 % of participants complain of chronic diseases. More than one-third of the study sample reported that the workload during COVID-19 pandemic increase by working with 4 to 5 patients in rotate shifts.

**Table (2):** Shows that (80.5%) of nurses were interested to follow the updated Covid-19 pandemic, and WHO were tracked by 36.4% of them.

**Figure (1):** Clarifies that fear of infection, lack of social support, heavy workload were the most perceived stressors among the participants' nurses by 94.1 %, 88.1%, and 78.8% respectively. Also, dying of the patients with COVID-19, lack of personal protective equipment (PPE), conflict with nurses, conflict with physicians, lack of COVID-19 guideline, and lack of competency were perceived stressors by 78%, 75.4%, 72.9%, 58.5%, 53.4%, and 44.9% of nurses respectively.

**Table (3):** As illustrated in the mean score of PTSD symptoms was (54.93±16.86) among the participant nurses, (47.5%) of the participants were reported moderate level of PTSD symptoms, and (39.0%) were reported severe level of PTSD symptoms.

**Table (4):** Clarifies that there was a statistical significant positive correlation between nurse to patient ratio and their PTSD level ( $r = .198^*$ ). Whereas, a negative correlation without statistical significance was found between age, marital status, education, and years of experience with PTSD score indicating that the nurses who were younger in age, single, hold BSN, and highest years of experience had less stress score.

**Table (5):** Clears that there is a positive significant correlation between PTSD and workload, dying of COVID 19 patient, conflict with nurses conflict with physician, lack of competency, and fear of infection among participant nurses ( $r = .370^{**}$ ,  $r = .268^{**}$ ,  $r = .268^{**}$ ,  $r = .265^{**}$ ,  $r = .272^{**}$ ,  $r = .277^{**}$ ) at  $P < .05$  respectively.

## Discussion

Covid-19 is a new pandemic that has raised fear and stress among medical professionals. Nurses represent

the front-line fighters caring patients with COVID-19, and as a result, they are more likely to have psychological effects, which can range from psychological distress to mental health disorders (D'Ettoire et al, 2021). More than two thirds of the participants' nurses in the study were female and their average age (25.78±3.19) years old. This can be attributed to the fact that females are more likely than males to undergo specific trauma types that appear to be more traumatic or cause PTSD. In this line (Liu et al, 2020) study results reported that the most of study sample were female but their age more than 35 years old.

In the current study, it was found that most of the participants were enthusiastic to learn about COVID-19 pandemic and the most important sources of information that have been followed up by them was the World Health Organization. This is due to the World Health Organization's history in issuing warnings, tracking the disease, promoting awareness, and providing updated information about the pandemic to countries around the world in multiple languages. This in constrict with study conducted by (Olaimat et al, 2020) documented that the internet is the main source of the participants' information about COVID-19 involving electronic websites and social media as Facebook, then mass media as TV, and at last, scientific websites.

The majority of participant nurses mentioned that the fear of infection is the major factor associated with their feeling of stress. This is can be attributed to the method of Coronavirus transmission especially when the world was oscillating between airborne and droplet transmission, the length of the incubation period of 14 days, and fear of carrying the infection to their family. This can be also attributed to the younger age and female gender of the most participants, and providing direct care and contact with COVID-19 patients. Another stress factors finding in our study were that, lack of social support, workload, dying of the patients with COVID-19, lack of personal protective equipment.

In addition, as supported by the correlational analysis in our paper, the perceived stress factors associated with PTSD were the workload, dying of COVID-19 patients, conflict, lack of competency, and fear of infection. In line with this findings, a series of recent reviews (Benfante et al, 2020; Brooks et al, 2020, Kisely et al, 2020; Rajkumar, 2020; Spoorthy, 2020 & Walton et al, 2020) highlighted that risk factors, such as exposure to infected people, fear of infection transmission, being female, younger, being a nurse, lack of adequate protective equipment, increase death rate have been found to be associated to post traumatic stress.

In the present study, it was found that the majority of the participant nurses their PTSD symptoms ranged between moderate and severe. This can be attributed to un-controlling the pandemic and discovering a new variant of the coronavirus like delta variant which appears to cause more severe illness, increases the nurses' worry and stress. In this line, the study "Mental Health Outcomes Among Frontline and Second-Line Health Care Workers During the Coronavirus Disease 2019 (COVID-19) Pandemic in Italy" conducted by (Rossi et al. 2020), performed in Italy between 27 and 31 March 2020, during the peak of the outbreak in Italy, showed a higher occurrence of health care workers being affected by PTSD. Moreover, (Boyratz; Legros, 2020 & Pan. et al. 2020) documented that increase prevalence of PTSD among nurses dealing with COVID-19 patients. On the otherwise (Song et al. 2020), conducted "Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China" study from 28 February 2020 to 18 March 2020, when the outbreak in China had been controlled, found lower prevalence rates of PTSS (9.1%).

#### Limitation of the study

The study sample in this study were limited to one hospital, which may not determine the PTSD of all nursing staff in Egypt, so further studies on a large sample size and multiple hospitals are required.

#### Conclusion:

The rate of post-traumatic stress disorder was higher among critical care nurses who caring patients with COVID-19. Also, this study documented that PTSD positively correlated with workload, dying of COVID 19 patient, and fear of infection among participant nurses.

#### Recommendations:

We recommended further study to investigate the impact of the COVID-19 on mental health of critical care nurses and to educate them about post-traumatic stress disorder and professional activities to prevent and manage this disorder.

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This study did not receive any funding.

#### Acknowledgment

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**Conflict of interest:** No conflict of interest in this study.

#### References:

▪ Aminizadeh M, Tirgari B, Iranmanesh S, Garoosi B, Karimi M & Sheikh-Bardsiri H. (2013): Post-traumatic stress disorder prevalence in

employees of emergency departments of teaching hospitals affiliated to Kerman University of Medical Sciences, Iran. *J Man Med Inform.*; 1(1): 18-25.

- Benfante A, Di Tella M, Romeo A & Castelli L. (2020): Traumatic Stress in Healthcare Workers During COVID-19 Pandemic: A Review of the Immediate Impact. *Front. Psychol*; 11: (2816).
- Blevins, C., Weathers, F., Davis, M., Witte, T., & Domino, J. (2015): The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and Initial Psychometric Evaluation. *J Trauma Stress*; 28(6).
- Boyraz G & Legros D. (2020): Coronavirus Disease (COVID-19) and Traumatic Stress: Probable Risk Factors and Correlates of Posttraumatic Stress Disorder. *Journal of loss and trauma*; 25(6-7):503-522
- Brooks, S., Webster, R., Smith, L., Woodland, L., Wessely, S & Greenberg, N., (2020): The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*; 395(10227): 912–920.
- Choi, E.M, & Bae, S.H. (2020): Nursing Performance, Compassion Fatigue, and Job Stress in Emergency Room Nurses. *J. Muscle Jt. Health*; 27:41–49.
- Circenis, K. & Millere, I. (2011): Compassion fatigue, burnout, and contributory factors among nurses in Latvia. *Procedia-Soc. Behav. Sci.*; 30: 2042–2046.
- D'Ettorre, G., Ceccarelli, G., Santinelli, L., Vassalini, P., Innocenti, G., Alessandri, F., Koukopoulos, A., Russo, A., d'Ettorre, G., & Tarsitani, L. (2021): Post-Traumatic Stress Symptoms in Healthcare Workers Dealing with the COVID-19 Pandemic: A Systematic Review. *International journal of environmental research and public health*; 18(2): 601.
- Heesakkers H, Zegers M, Mol M & Boogaard M.(2021): The impact of the first COVID-19 surge on the mental well-being of ICU nurses: A nationwide survey study. *Intensive & Critical Care Nursing*; 65:103034
- Hosseininejad S, Jahanian F, Elyasi F, Mokhtari H, Koulaei M & Pashaei S. (2019): The prevalence of post-traumatic stress disorder among emergency nurses: a cross sectional study in northern Iran. *BioMedicine*; 9 (3):146
- Jiang, H., Nan, J., Lv, Z., & Yang, J. (2020): Psychological impacts of the COVID-19 epidemic on Chinese people: Exposure, post-traumatic stress symptom, and emotion regulation. *Asian Pacific Journal of Tropical Medicine*;13 (6): 252-259
- Kang, Y.H.; & Shin, K.R. (2020): COVID-19. Korean nurses' experiences and ongoing tasks for

- the pandemic's second wave. *Int. Nurs. Rev.*; 67, 445–449.
- **Kisely, S., Warren, N., McMahon, L., Dalais, C., Henry, I., & Siskind, D. (2020):** Occurrence, prevention, and management of the psychological effects of emerging virus outbreaks on healthcare workers: rapid review and meta-analysis. *BMJ*; 369: 642.
  - **Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, Wu J, Du H, Chen T, Li R, Tan H, Kang L, Yao L, Huang M, Wang H, Wang G, Liu Z, & Hu Sh. (2020):** Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open*; 3(3):203976.
  - **Lee M, & Hong Sh. (2021):** Factors Affecting Secondary Traumatic Stress of Nurses Caring for COVID-19 Patients in South Korea. *Int. J. Environ. Res. Public Health*; 18(13): 6843.
  - **Liu N, Zhang F, Wei C, Jia Y, Shang Z, Sun L, Wu L, Sun Z, Zhou Y, Wang Y & Liu W (2020):** Prevalence and predictors of PTSS during COVID-19 Outbreak in China Hardest-hit Areas: Gender differences matter. *Psychiatry Research*; 287:112921
  - **Lu H, Stratton CW & Tang YW. (2020):** Outbreak of pneumonia of unknown etiology in Wuhan, China: The mystery and the miracle. *J Med Virol.*; 92(4): 401–402
  - **Marcomini, I., Agus, C., Milani, L., Sfogliarini, R., Bona, A., & Castagna, M. (2021):** COVID-19 and post-traumatic stress disorder among nurses: a descriptive cross-sectional study in a COVID hospital. *La Medicina del lavoro*; 112(3): 241–249.
  - **Mealer M, Jones J, & Meek P. (2017):** Factors affecting resilience and development of posttraumatic stress disorder in critical care nurses. *Am J Crit Care*; 26(3): 184-92.
  - **Missouridou, E. (2017):** Secondary posttraumatic stress and nurses' emotional responses to patient's trauma. *J. Trauma Nurs.*; 24(2): 110–115.
  - **Ning L, Guan S & Liu J. (2017):** Impact of personality and social support on posttraumatic stress disorder after traffic accidents. *Medicine (Baltimore)*; 96(34): 7815.
  - **Olaimat A, Aolymat I, Shahbaz H & Holley R. (2020):** Knowledge and Information Sources About COVID-19 Among University Students in Jordan: A Cross-Sectional Study. *Front. Public Health*; 8(254).
  - **Pan A., Liu L., Wang C., Guo H., Hao X., Wang Q., Huang J., He N., Yu H & Lin X. (2020):** Association of public health interventions with the epidemiology of the COVID-19 outbreak in Wuhan, China. *JAMA.* ; 323:1915–1923.
  - **Rajkumar, R. (2020):** COVID-19 and mental health: a review of the existing literature. *Asian J. Psychiatr*; 52:102066.
  - **Rossi R., Soggi V., Pacitti F., Di Lorenzo G., Di Marco A., Siracusano A & Rossi A. (2020):** Mental Health Outcomes Among Frontline and Second-Line Health Care Workers During the Coronavirus Disease 2019 (COVID-19) Pandemic in Italy. *JAMA Netw. Open*; 3:2010185.
  - **Song X., Fu W., Liu X., Luo Z., Wang R., Zhou N., Yan S & Lv C. (2020):** Mental health status of medical staff in emergency departments during the Coronavirus disease 2019 epidemic in China. *Brain Behav. Immun.*; 88:60–65.
  - **Spoorthy, M. (2020):** Mental health problems faced by healthcare workers due to the COVID-19 pandemic—a review. *Asian J. Psychiatr.*; 51:102119.
  - **Sun, N., Wei, L., Shi, S., Jiao, D., Song, R., Ma, L., Wang, H., Wang, C., Wang, Z., & You, Y. (2020):** A qualitative study on the psychological experience of caregivers of COVID-19 patients. *Am. J. Infect. Control*; 48: 592–598.
  - **Walton, M., Murray, E., & Christian, M. (2020):** Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur. Heart J. Acute Cardiovasc. Care*; 9: 241–247.