

## Investigation of Nurses' Mental Status during Covid-19 Outbreak - A Systematic Review

Pappa Despoina<sup>1</sup> & Dafogianni Chrysoula<sup>2</sup>

### Abstract

**BACKGROUND:** Coronavirus disease 2019 (COVID-19) appeared unexpectedly as an epidemic outbreak from Wuhan city, in China. It was spread quite fast globally, raising governments' awareness about possible public health threat leading many countries to take restrictive measures in order to protect their citizens. Nursing staff is among frontline healthcare workers that are exposed daily in such cases providing care to patients by all means. **AIM:** This review aims to investigate the psychological impact of this outbreak on nurses working under high-demanding situations. **METHOD:** The design of this study was about a systematic research review. Search procedure was based on specific databases using keywords for nurses and the COVID-19 pandemic. **RESULTS:** 41 reports of original researches were found after criteria justification and databases search. Studies with nursing population and time limitation from December 2019 to March 2020 along with the presentation of COVID-19 outbreak were included. Finally, 6 reports were included in this review. **CONCLUSION:** Reporting severe symptoms of anxiety, fear, depression and many other negative emotions, it is urgent for hospital administrations to apply efficient measures for nurses to empower their mental health status during COVID-19 pandemic.

**Key words:** nurses; COVID-19; Coronavirus 2019;

### 1. Introduction

It was December, 2019, as the first incidents of unexplained pneumonia appeared in Hubei Province, Wuhan, in China. The local medical community was alarmed due to significant findings that revealed the human-to-human transmission, without knowing the exact initial cause. According to epidemiological updates, this pneumonia has begun to spread on not only locally but also in remote areas too. The World Health Organization (WHO, 2020) has named this pneumonia-related disease as Coronavirus Disease 2019 (COVID-19) and soon received serious attention due to rising incidence in Chinese mainland. The spread of the Coronavirus-19 was begun within a month by reporting cases in neighboring countries and individually in Europe and America. As of March 26, 2020, China had 81,285 total cases, while worldwide there were 462,684 cases recorded and 20,834 deaths (WHOa, 2020). What is impressive, however, is the fact that some European countries, such as Italy and Spain, had extremely high virus transmission speeds, with a significantly higher incidence of deaths than China. In the case of Italy, this may be due to the aging population, but also the need of the government to take restrictive measures earlier. This situation leads the hospitals' staff to catch up with a difficult and quite stressful reality. The frontline medical staff of the countries involved has to manage patients with COVID-19 symptoms, such as fever, dry cough, fatigue, headaches etc. (Huang et al., 2020) using WHO guidelines and national competent authorities, at a time when there is no clear and documented medical treatment of such incidents. In addition to clinical trials of possible treatments, which require a specific period of time for their approval, staff is at risk of contagion, as there are records of health professionals' illness, but also in continuous worry about the future of this pandemic. Similar events have happened several years ago, awakening memories of the SARS pandemic, for example, which has caused not only human losses but also raised significant worries, phobias and strong emotions to other people (Chiu et al., 2003; Leung & Ooi, 2003). Thus, it is very possible that the prolonged feeling of agony, serious depressive tendencies, post-traumatic stress, and even suicide are likely to be developed in the global community. Nurses are always in the forefront of any dangerous medical situation, like infections and it should be given special attendance to this part of staff.

#### 1.1. Nurses in front of an outbreak

It is well known that humanity faced several health threats some years ago. Ebola virus disease, in 2018, H1N1 flu, in 2009, SARS epidemic, in 2003 and many more diseases in the previous years killed thousands of people in many countries.

<sup>1</sup> RN, MSc, PhD(c), Hygeia Hospital of Athens, University of West Attica, Greece

<sup>2</sup> RN, BSc, MSc, PhD, Associate Professor, Department of Nursing, University of West Attica, Greece

Each virus affected differently the individuals causing devastating complications. Coronavirus disease is the new threat for global public health and especially for each country's health system. It can be transmitted through air droplets, contact and aerosols (Special Expert Group for Control of the Epidemic of Novel Coronavirus Pneumonia of the Chinese Preventive Medicine, 2020). On January 30, 2020, WHO announced COVID-19 as a global public health emergency and two months later, approximately, on March 11, called it pandemic. Such situations threaten not only physical status but also the mental health of people. Constant worries and fears can be presented among individuals and everyone can perceive this reality in a different way (Khalid et al., 2016). Fear could be the worst ally for someone and as Zhong Nanshan stated, psychological fear can be more fearful than the disease itself (Liu, 2003). Due to the rapid spread of Coronavirus, medical teams were given guidelines to deal with patients who appear to have the specific COVID-19 symptoms. The number of patients was excessive and unbearable for some hospitals. The increasing need for acute and intensive care was a fact along with the staff and equipment shortness. Healthcare workers must provide patient care but they have to protect themselves too (American Nurses Association, 2020). Working in situations of crisis can cause overwhelming psychological pressure to nursing staff. Nurses stand next to the patients much more time than other health professionals, coping with the direct and threatened needs of them. Wong et al. (2005) stated in their study that nurses came up with much more pain than doctors during Ebola outbreak. Several studies revealed that nurses who face the possibility of contagion of them (Liao et al., 2017; Askim et al., 2018; Nayeri et al., 2019) and their families experience high levels of stress, depression symptoms, resignation and stigmatization. After the case of SARS, many reports mentioned the emotional impact on caring of contagious people, promoting the development of nursing care models and assessing the care provided (Watson, 2009). Of course, mental health of health care workers will be influenced by pressing conditions and it is easy to understand that psychological support to nurses could contribute to better job performance (National Health Commission, 2013). In 1996, Saakvitne and Pearlman used for the first time the term vicarious traumatization and in 2020, Li & colleagues combine it with the COVID-19 outbreak. This term refers to an unwilling connection of the health professional with his patient due to prolonged exposure to his/her disease. More specific, the researchers connected vicarious traumatization with medical staff and general public. Frontline nurses seem to experience in some extent vicarious traumatization during Covid-19 exposure but non-frontline nurses have higher severity of this condition and it is more likely to experience psychological problems. As COVID-19 continues spreading across the world, public health experts emphasize on healthcare and hospital resources urgent need (Jiang et al., 2020; Pan et al., 2020). As always, nurses form a big staff part in hospital and play a significant key role not only by preventing contagion among others but also providing advice and education to non-professionals. Nursing in community, outpatient and acute care settings is a risk throughout providing care. Nurses have to protect themselves and follow the guidance of the Centers for Disease Control and Prevention (CDC, 2020) or other official health agencies. They will always be at the frontline caring for the patient, assuring that he or she receives the best quality of care and assessing each time the possibility of increased care need. The worldwide pandemic requires nurses' cooperation towards clinical care, education and shape of a public health policy that they will have to share and promote. World Health Assembly has designated 2020 the International Year of Nurse and the Midwife (ICN, 2019). Through this pandemic crisis, all nurses must constantly prove their importance, necessity and value within a holistic health care system aiming to enhance Nursing profession.

## 2. Aim

This systematic review aims to explore the psychological impact of the COVID-19 outbreak on nurses' mental health, who work under difficult situations trying to provide best care to their patients. Because of the sudden appearance and fast spread of this virus, the review is based on a short period limitation and had two specific aims:

1. To investigate the nursing studies that took place due to this outbreak and synthesize a summary of them.
2. To present the search results so as to sensitize health agencies towards possible psychological needs of nurses working with COVID-19 patients.

## 3. Method

According to the guidance of Kitcenham & Bacca (2004) methodology, we, firstly, organized the plan of this systematic review which was to deal with a nursing issue on a well timed topic to provide important data for evaluation and sensitization of the health professional population. After that, we conducted a search strategy which had to do about the inclusion criteria of the studies, the time limitation and the type of the reports. The last step was to present all the appropriate studies that could help in understanding the influence of COVID-19 in nursing population's mental status.

In this research procedure, we used academic databases such as Medline through Pubmed and one academic research engine (Google Scholar), due to important findings for this topic that were not appeared in the

previous two databases (Pubmed/Medline). So, we considered that every scientific finding should be included at this time. Initially, we used keywords like nurses; AND mental health; AND covid-19; AND anxiety; but the search results were very few. So, we widened the outcome by using the words nurses; AND covid-19; By this time, on March 27, 2020 we came up with forty-one items from Pubmed and three from Google Scholar search engine. Time limitation was a three-month period that Covid-19 exists globally and the studies included herein were about nurses only.

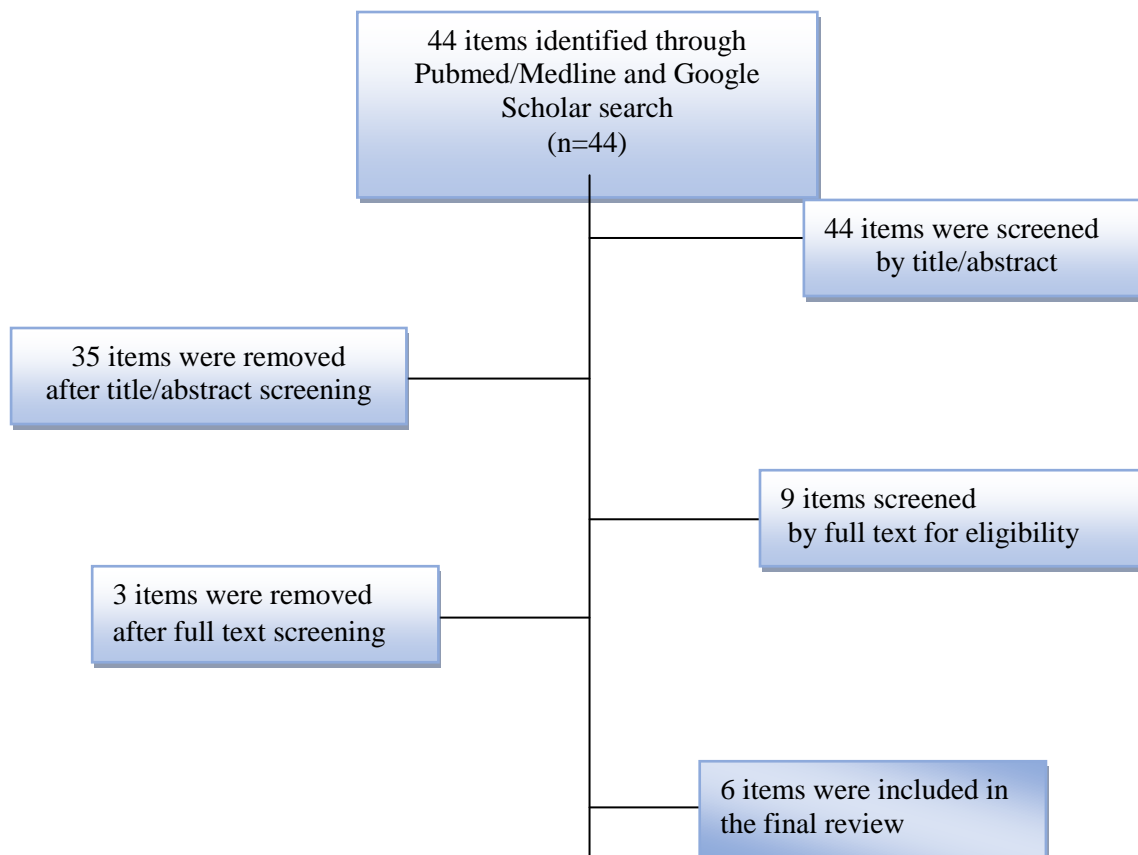
### 3.1. Search outcome

The results of the research are shown in *Table 1*. A total of forty-four reports were found using the specific keywords. As mentioned above, forty-one items came from Pubmed, Medline database and three from Google Scholar search.

**Table 1.** Electronic databases searched and number of results.

Database	Papers identified
Medline (through PubMed)	41
Google Scholar (academic research)	3
<b>Total</b>	<b>44</b>

A flow diagram illustrates the search and screening process and can be viewed in *Fig.1*. From the total number of surveys, we examined the titles and abstracts to check the relevance of the content to the subject of the review. Three out of the forty-four surveys found via pubmed database, were completely relevant to the topic. There were two editorials and one correspondence article that contained important information on the practice of clinical nursing in pandemic situations, but could not be included in this review. Finally, three more studies were included in this search, out of pubmed database.



**Figure 1.** Flow chart documenting the selection process

#### 4. Results

The main findings are oriented towards the mental status of nurses working in hospital with COVID-19 patients. All of the studies took place in Chinese hospitals because Wuhan city, in China was the epicenter of the pandemic and by this time, there has been quite reasonable time to organize and accomplish a research study with a sample of medical staff population. Lai et al. (2020) conducted a survey about the factors associated with mental health outcomes of health care professionals working with coronavirus-19 patients. 764 out of 1257 individuals were nurses working, some of them, in Wuhan and in frontline settings. According to their findings, nurses, female medical workers and frontline professionals experienced symptoms of depression, anxiety, distress and insomnia in a severe degree than other staff. 7,1% of nurses stated severe depression vs. physicians (4,9%). Severe insomnia was found in 1,7% of the total frontline workers. A significant finding in this section was that second-line workers were found to experience severe depression symptoms than those in front-line. Health care workers were especially measured by senior, intermediate or junior technical title. The existence of an intermediate professional title of health workers was associated with severe symptoms of depression, anxiety and distress. Most of the nurses had a junior title (n=546), 191 of the total nursing sample were intermediate and 27 were senior nurses. Researchers completed their survey by stating that providing front-line health care composes an independent risk factor for unpleasant mental health outcomes of people who endanger their integrity through COVID-19 pandemic. In another study, Liu and colleagues (2020) investigated the mental health status of 1853 doctors and 2826 nurses aiming to identify the key population of psychological intervention. They collected questionnaires from 348 hospitals in mainland China within a week (17<sup>th</sup> to 24<sup>th</sup>, February). Most of the sample were females (82,3%) and 57,4% had bachelor's degree. The average age of the participants was  $35,9 \pm 9$  years old. A total of 60,7% of the sample had no mental health problem and approximately 9% appeared with anxiety, depression and distress. Nurses appear to have psychological distress, anxious symptoms and depression signs in 15,3%, 17,6% and 39,2% respectively and quite higher from doctors' percentages. Both doctors and nurses from high-risk departments mentioned in higher prevalence of the above three mental problems.

Distress and anxiety appeared in health care professionals who had treating contact with COVID-19 patients along with 37,2% with depressive symptoms. It is important to mention that 35,7% of the sample had received psychological counseling or intervention some time before the outbreak. Last but not least, the mental health status of nurses could be influenced by the psychological condition of patients due to prolonged nearby stay of nurse to them. Huang, Xu and Liu (2020) investigated a few days before the previous study the emotional responses of nurses and nursing college nurses during COVID-19 outbreak along with the coping strategies. A total of 802 valid and complete questionnaires were included. 374 nurses and 430 nursing students were the two basic parts of the study population. Nurses and students from rural and urban cities, males and females, cities from different epidemic levels participated in this survey. Researchers used a 5-point scale for nurses and students experiencing anxiety, fear, sadness and anger during Coronavirus-19 outbreak. They also used BriefCope tool to measure coping strategies in this specific period of time. This tool is based on problem-focused and emotional-focused of participants coping to report how often they apply one out of two strategies in each project at the time of outbreak. According to their findings, nurses experience anxiety ( $t_{(799,33)}=3.05$ ,  $p=0.002$ ), fear ( $t_{(799,33)}=3.05$ ), sadness ( $p=0.000$ ) and anger ( $t_{(802)}=4.56$ ,  $p=0.002$ ) in significantly higher levels than nursing students. Women participants had also higher levels of anxiety ( $t_{(802)}= -3.62$ ) and fear ( $t_{(314,44)}= 5.17$ ) than men. Testing one-way ANOVAs due to severity examination of COVID-19 in the city for each emotion, no significant differences found. However, significant difference was found after multiple comparisons of anxiety and space distance of Coronavirus-19 patients. Anxiety in near space distance found to be greater than far space ( $p=0.000$ ). The same ( $p=0.000$ ) was found for anger emotion and near distance too. In terms of coping strategy nurses use quite more often problem-focused coping methods (active coping, planning, and use of instrumental support) than nursing students, as females do too. Several correlations have been made among each four emotions and coping strategies after controlling identity, spatial distance, gender and rural-urban relationship. These four emotions were positively correlated with problems and emotion-focused coping ( $ps<0.001$ ). In another one cross-sectional survey from China (Zhu et al., 2020), in which 79 doctors and 86 nurses participated, researchers studied the prevalence and influencing factors of anxiety and depression in the first line medical staff during Covid-19. Clinicians completed three questionnaires: self-rate anxiety scale (SAS), self-rate depression scale (SDS) and the Simplified coping style questionnaire (SCSQ). 24 out of 86 nurses (27,9%) were the prevalence rate for anxiety and 37 out of 86 (43%) of depression. History of anxiety or depression was an independent risk factor in nurses. However the study is based on a small size of healthcare staff, especially nurses, decreasing the reliability of the research. Jizhen et al. (2020) conducted a survey on medical staff mental health in Covid-19 hospitals. Nurses were found to have more anxiety than doctors (26,88%-43/160 vs. doctors 14,29%-10/70) with statistically significant difference. Their results of nurses' anxiety were slightly higher than Yuan Yuan's et al. (2019) who correlated anxiety and depression status of medical staff. Vicarious traumatization is a term recently connected with healthcare workers during Coronavirus-19 pandemic.

It was mentioned above and Li with colleagues (2020) accomplished a study about this phenomenon in the general public, members and non members of medical teams aiding in Covid-19 control. The sample of this study consists of 214 general public individuals and 526 nurses (234 front line nurses and 292 non-front line members) to assess vicarious traumatization scores. Front-line nurses experience lower scores of vicarious dramatization than general public and non-front-line nurses (64 FLNs vs. 75,5% GP vs. 75,5%nFLNs). 96 out of 234 front line nurses most of the participants work in critical care medicine and 142 of non-front-line nurses in surgery departments. Also, most of the sample of nurses possesses a senior title. This study aimed to emphasize that general public and non-front-line nurses had no significant difference in vicarious traumatization scores, possibly due to strict Chinese policy to face Coronavirus-19 epidemic. This means that these two groups were forced to avoid face-to-face contact and communication.

<b>Author, year &amp; country</b>	<b>Design</b>	<b>Aim of the study</b>	<b>Sample</b>	<b>Mental health measure</b>	<b>Findings</b>
<b>Li et al., 2020, China</b>	Descriptive	To evaluate vicarious traumatization scores in the general public, members and non-members of medical teams.	740 total (214 general public, 234 front-line nurses, and 292 non front-line nurses).	Mobile app of a 38-item questionnaire with physiological and psychological responses.	Frontline nurses appear (FLN) to have lower vicarious traumatization scores than non frontline nurses. General public scores were higher than FLN.
<b>Lai et al., 2020, China</b>	Cross-sectional, survey-based, region-stratified study	To assess the magnitude of mental health outcomes and related factors among health professionals working with COVID-19 patients.	1257 health care workers (764 of them were nurses)	9-item-Patient Health Questionnaire, 7-item-Generalized Anxiety Disorder scale, 7-item-Insomnia Severity Index and the 22-item- Impact of Event Scale-Revised.	A proportion of health care workers experienced depression, anxiety, insomnia, and distress, especially women and nurses and front-line workers.
<b>Jixuan et al., 2020, China</b>	Cross-sectional	To investigate the mental health status of clinical front-line medical staff during COVID-19 outbreak.	246 front-line medical staff (nurses included)	Self-assessment scale for anxiety (SAS) and self-assessment scale for post-traumatic stress disorder (PTSD-SS).	The incidence of anxiety was higher in nurses than that of doctors (26,88% vs 14,29%). The stress score was higher in female medical staff.
<b>Zhu et al., 2020, China</b>	Cross-sectional	To understand the prevalence and influencing factors of	165 health professionals (86 nurses)	SAS, self-rating depression scale (SDS) and the simplified	The prevalence rate of anxiety and depression symptoms

			anxiety and depression in medical staff during COVID-19 in Gansu.		coping style questionnaire (SCSQ).	among nurses was 27,9% and 43%. History of depression was a common risk factor.
<b>Liu et al., 2020, China</b>	WeChat-based survey	To investigate the mental health status of health staff and to identify the key population pf psychological intervention.	4679 total (2826 nurses)	SAS, Self-reporting Questionnaire (SRQ-20), SDS		Being a nurse, Working at high-risk departments, treating patients with COVID-19 had higher risk of developing distress, anxiousness and depression.
<b>Huang et al., 2020, China</b>	Online questionnaire survey	To investigate the current state of emotional responses and coping strategies of nurses and college nurses students during COVID-19	802 total (374 nurses and 430 college nurses).	BriefCOPE tool, 5-point scale for anxious, fear, anger and sadness.		Nurses showed higher levels of anxiety (P=0.002), sadness ( $t_{(799.33)}=4.59$ , P=0.000). Nursing college students had stronger emotional responses and more willing to Problem-focused coping.

**Table 2:** Summary table of included papers

## 5. Discussion

Nurses are central to the management and controlling of the pandemic both in the hospital environment and in the community. The provision of good-quality nursing (Shih et al., 2007; Chan, 2003; Tzeng, 2003) care in such situations depends on the proper management of human and material resources (Chan-Yeung, 2004) in hospitals but also on the health status of the nurses themselves, especially in psychological level. According to several studies, both for the present Coronavirus pandemic and for previous ones (Nickell, 2004), the nursing population experiences strong feelings of anxiety, depression and fear depending on different demographic data, the distance they have from the facing and treatment of such patients, the perceived gravity of the matter etc. The majority of the studies suggested that there are increased levels of anxiety in medical teams but nurses, specifically, seem to experience anxious or depressive symptoms in higher percentages than doctors and general public (Li et al., 2020; Liu et al., 2020) . This is explained by the prolonged stay of the nurse in wards due to treatment continuity or the direct exposure to such patients in acute care settings. Female gender and nurses with an intermediate technical title appear to have severe anxiety, depression and distress for this pandemic situation. In SARS outbreak, psychological distress was reported too. 42000 health care professionals work in Wuhan and 68% of them are nurses (National Health Commission, 2020). Researches indicate that high priority in total support should be given to this part of staff (Liu et al., 2020).

Findings from the same study emphasize, also, in possible previous psychological help to medical staff implicating the targeted attention which must be given. A very important key population is the front-line nurses who undertake unintentionally not only the management of an infectious patient but also the education of the suspected cases and patients in community towards better understanding of the pandemic situation by clearing up at the same time the fact of the misinformation provided by different means (Wen et al., 2020). Nursing individuals experience differently a psychological crisis. A study between nurses and nursing students during COVID-19 outbreak (Huang et al., 2020) showed the high prevalence rate of anxiety, fear, sadness and anger of nurses associated with students. It is easy to understand that nurses who have much more experience, knowledge and frequent contact with patients may perceive in a better way the real danger from an epidemic outbreak than nursing students. However, this was a quite useful approach in order to sensitize the students towards careful nursing care using the protection measures when needed and realize the importance of nurses' role to the medical team and the health system, in general. Being a nurse at the core of infection risk causes concern about being infected too, worry about nurses' family infection danger, possible isolation policy, working conditions (Chan-Yeung, 2004) and sadness towards suffering and even death, quite often, of critically ill patients (Huang et al., 2020). These situations can lead the health professional to develop self-defeat, self-blame and emotions of guilt and failure. It is not easy to fight against an infectious pandemic. Luckily, there are many nurses who experience this situation as stimuli for professional responsibility and altruism (Mauder et al., 2003). A strong mental status is required in order to adopt an effective coping strategy during a pandemic. Problem-focused and emotional-focused coping strategies are recorded through studies. Nurses seem to use mostly the problem-focused strategy (Huang et al., 2020) owing to having more experience to similar pressures. Last but not least, it is the attitude of patients itself that can have a serious impact on nurses' resilience towards these situations. When a patient does not want to cooperate with the treatment because of his temper or fear of his own life threatening, nurses have to make greater efforts to persuade him keeping up with instructions (Chen et al., 2020). The picture of a powerless and sometimes a hopeless patient for a prolonged time creates a psychological threat for nurses. Health institutions must provide psychological skills training to strengthen nurses' ability to endure such pressures and manage them efficiently (Chen et al., 2020; Li et al., 2018).

## 6. Conclusion

Nurses have been, and will continue to be, the frontline professionals in treating patients not only through their direct contact within acute care departments but also for their 24-hour stay next to the patients, treating them in nursing institutions or in the community. It is agreed that it is the duty of the nurse not only to provide the best health care, with all the necessary and appropriate means, but also to prevent situations which would incommode and expose the individual to danger and risk overall public health. Apart from nurses' obligations, we must accept that nurse is a human being too. This person has his own personality, characteristics, specific mental status and endurance. In the practice of nursing, health institutions should investigate, organize, implement and evaluate psychological support programs for all health professionals with the ultimate aim of empowering and encouraging staff. Mental health of nursing population should be assessed by experts via interviews and questionnaires following a typical procedure within hospitals. Assisting with additional staff and specific absence days for employee could be an efficient measure for nurses to rest during a crisis. Through this COVID-19 outbreak nurses are likely to develop fatigue, burnout, phobias and many more negative emotions due to the ultimate fear of contagion and uncertainty of spread. Many more studies have to be done to contribute to nursing society and show the need of measures upon an outbreak that have to be taken. Enhancing nurses' resilience towards this pandemic is strongly needed so nurses can obtain greater level of mental health to deal with infectious patients with a high risk of transmission to them and provide excellent care at all levels of health.

## References

- American Nurses Association. (2020). Coronavirus Disease (COVID-19). <https://www.nursingworld.org/practice-policy/work-environment/health-safety/disasterpreparedness/coronavirus/>
- Askim A, Gustad LT, Paulsen J, et al. (2018). Anxiety and Depression Symptoms in a General Population and Future Risk of Bloodstream Infection: The HUNT Study. *Psychosomatic medicine*. Sep;80(7):673-679.
- Center for Disease Control and Prevention. (2020). Coronavirus Disease 2019 (COVID-19). <https://www.cdc.gov/coronavirus/2019-nCoV/summary.html>
- Chan-Yeung M. (2004). Severe acute respiratory syndrome (SARS) and healthcare workers. *Int J Occup Environ Health*;10(4):421-427.
- Chan S. (2003). Nurses fighting against severe acute respiratory syndrome (SARS) in Hong Kong. *J Nurs Scholarsh*; 35(3):209.

- Chen, Q., Liang, M., Li, Y., Guo, J., Fei, D., Wang, L., ... & Wang, J. (2020). Mental health care for medical staff in China during the COVID-19 outbreak. *The Lancet Psychiatry*, 7(4), e15-e16.
- Chiu HFK, Lam LCW, Chiu E (2003). SARS and psychogeriatric – perspective and lessons from Hong Kong. *International Journal of Geriatric Psychiatry*, 18: 871–873.
- Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., & Cheng, Z. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, 395(10223), 497-506.
- Huang, J. Z., Han, M. F., Luo, T. D., Ren, A. K., & Zhou, X. P. (2020). Mental health survey of 230 medical staff in a tertiary infectious disease hospital for COVID-19. *Chinese journal of industrial hygiene and occupational diseases*, 38, E001.
- Huang, L., & Hairong Liu, H., Fuming X., (2020). Emotional responses and coping strategies of nurses and nursing college students during COVID-19 outbreak. *medRxiv*.
- International Council of Nurses (ICN), Press Information, Geneva, Switzerland, 30th December 2019
- Jiang, Y., Wang, H., Chen, Y., He, J., Chen, L., Liu, Y., & Zou, H. (2020). Clinical Data on Hospital Environmental Hygiene Monitoring and Medical Staff Protection during the Coronavirus Disease 2019 Outbreak. *medRxiv*.
- Kitchenham, B. (2004). Procedures for performing systematic reviews. Keele, UK, Keele University, 33(2004), 1-26.
- Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., & Tan, H. (2020). Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open*, 3(3), e203976-e203976.
- Leung PC, Ooi EE (2003). *SARS War: Combating the Disease*. New Jersey: World Scientific.
- Li, Z., Ge, J., Yang, M., Feng, J., Qiao, M., Jiang, R., & Zhou, Q. (2020). Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain, Behavior, and Immunity*.
- Li Zhongchen, Wang Kang, Zhu Xinyi, et al. (2018). The mediating role of psychological capital of medical staff in comprehending social support and job satisfaction. *Chinese Journal of Industrial Hygiene and Occupational Diseases*, 36(8):594-597.
- Liao YT, Hsieh MH, Yang YH, et al. (2017). Association between depression and enterovirus infection: A nationwide population-based cohort study. *Medicine*. Feb;96(5):e5983.
- Liu, Z., Han, B., Jiang, R., Huang, Y., Ma, C., Wen, J., & Ma, Y. (2020). Mental Health Status of Doctors and Nurses During COVID-19 Epidemic in China. Available at SSRN 3551329.
- Liu, Y (2003 May 5). Zhong Nanshan: The Beijing epidemic is controllable. *WenWei Po*, p.A05.
- Maunder R, Hunter J, Vincent L, et al (2003). The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *Canadian Medical Association Journal*, 168: 1245–1251.
- National Health Commission. Transcript of press conference on February 29, 2020. <http://www.nhc.gov.cn/xcs/fkdt/202002/f6557445863a447f87014e514263dd91.shtml>. (accessed Mar 1, 2020).
- National Health Commission. China health statistics yearbook in 2013. <http://www.nhc.gov.cn/htmlfiles/zwggkzt/ptjnj/year2013/index2013.html>. (Accessed Mar 1, 2020).
- Nayeri Chegeni T, Sharif M, Sarvi S, et al. (2019). Is there any association between *Toxoplasma gondii* infection and depression? A systematic review and meta-analysis.;14(6):e0218524.
- Nickell, LA, (2004). Psychosocial effects of SARS on hospital staff: survey of a large tertiary care institution. *Canadian Medical Association Journal*, 170(5): 793–798.
- Pan, L., Wang, L., & Huang, X. (2020). How to face the novel coronavirus infection during the 2019–2020 epidemic: the experience of Sichuan Provincial People’s Hospital. *Intensive Care Medicine*.
- Shih FJ, Gau ML, Kao CC, et al. (2007). Dying and caring on the edge: Taiwan’s surviving nurses’ reflections on taking care of patients with severe acute respiratory syndrome. *Appl Nurs Res*. 20(4):171-180.
- Special Expert Group for Control of the Epidemic of Novel Coronavirus Pneumonia of the Chinese Preventive Medicine. (2020). An update on the epidemiological characteristics of novel coronavirus pneumonia (COVID-19). *Chinese Journal of Epidemiology*, 41(2): 139-144.
- Tzeng HM., (2003). Fighting the SARS epidemic in Taiwan: a nursing perspective. *J Nurs Adm.*;33(11):565-567.
- Watson, R. (2009). Editorial: Looking back on SARS. *Journal of Clinical Nursing*, 18, 625–626.
- Wen, J., Aston, J., Liu, X., & Ying, T. (2020). Effects of misleading media coverage on public health crisis: a case of the 2019 novel coronavirus outbreak in China. *Anatolia*, 1-6.
- Wong TW, Yau JK, Chan CL, Kwong RS, Ho SM, Lau CC, et al. (2005). The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *Eur J Emerg Med*, 12: 13–8.



- World Health Organization. Clinical management of severe acute respiratory infection when Novel Coronavirus (nCoV) infection is suspected: interim guidance. Jan 11, 2020. [https://www.who.int/internalpublications-detail/clinicalmanagement-of-severe-acute-respiratoryinfection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/internalpublications-detail/clinicalmanagement-of-severe-acute-respiratoryinfection-when-novel-coronavirus-(ncov)-infection-is-suspected) (accessed 26, March 2020).
- World Health Organization, WHOa, Coronavirus disease 2019 (COVID-19) Situation Report – 66, [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200326-sitrep-66-covid-19.pdf?sfvrsn=9e5b8b48\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200326-sitrep-66-covid-19.pdf?sfvrsn=9e5b8b48_2), (accessed 26, March 2020).
- Yuan Yuan, Chen Ying, Han Haihong, et al. (2019). Correlation between anxiety and depression status and work intensity of medical staff [J]. *Chinese Journal of Health Psychology*, 27 (7): 1059-1063.
- Zhu, J., Sun, L., Zhang, L., Wang, H., Fan, A., Yang, B., & Li, W. (2020). Prevalence and Influencing Factors of Anxiety and Depression Symptoms in the First-Line Medical Staff Fighting Against the COVID-19 in Gansu. Available at SSRN 3550054.