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Comparison of Nurse Burnout, Before and During the COVID-19 Pandemic



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KEYWORDS

• Nursing burnout • MBI • Pandemic • COVID-19 • OBI

KEY POINTS

- Nurse burnout was not well researched in past pandemics.
- The COVID-19 pandemic has seen severe rating of nurse burnout.
- Nurse burnout is a serious concern that has been correlated with negative nurse outcomes.
- There is an urgent need for health care organizations to take steps to decrease nurse burnout.

INTRODUCTION

The recent COVID-19 (also known as the coronavirus, severe acute respiratory syndrome coronavirus 2 [SARS-CoV-2]) pandemic has presented nurses with extraordinary demands in providing complex care to patients with the disease, as well as taking elaborate measures to prevent the spread of the disease to other patients, their families, and themselves.¹ These unprecedented conditions have required nurses to work longer shifts with more acute patients and limited resources, potentially leading to nurse burnout.² Nurse burnout has been a challenge for nurses even before the recent pandemic, but we are now seeing reports of higher levels of burnout.³ This article looks at a history of pandemics and then examines the research of nurse burnout during previous and the current COVID-19

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pandemic. The authors conclude this article with recommendations for evidence-based interventions to decrease factors associated with nurse burnout based on our findings.

Background

Freudenberger was the first to use the term "burnout" in literature in the 1970s who defined burnout as a "state of fatigue or frustration that resulted from professional relationships that failed to produce the expected rewards."⁴⁻⁶ However, nurse burnout has become a popular term and has been defined in various ways by many investigators.⁴ The Maslach Burnout Inventory (MBI)⁷ has widespread use as an instrument used to measure burnout.⁴ Maslach⁸ stated that nurses have inherently stressful jobs that can result in emotional exhaustion, depersonalization, and reduced personal accomplishment. Emotional exhaustion is defined as a "depletion of one's emotional resources and the feeling that one has nothing left to give others."⁸ Depersonalization is a stage where a negative attitude toward work associates develops. The third aspect is feeling that your accomplishments do not meet personal expectations.⁸ It is for this reason that Zangaro and colleagues⁹ in their systematic review restricted their search of burnout to only articles that used the MBI to measure burnout in nursing. These articles in the Zangaro and colleagues⁹ systematic review spans from 2000 through 2019 and are used to investigate burnout before the COVID-19 pandemic. More recent literature is analyzed to report nurse burnout due to the COVID-19 pandemic. A recent study by the authors on nurse burnout during the COVID-19 pandemic is also discussed.

Carl Sagan said, "You have to know the past to understand the present," so in the spirit of understanding nurse burnout in the current COVID-19 pandemic, a look at literature dated before 2019 related to nurse burnout and pandemics are explored. It is essential to recognize that our population may become more prone to pandemics, as we have become a global community. The risks of spreading pathogens across geographic areas have increased.¹⁰ Other contributing factors associated with the transmission of pathogens are cross-species transmission, climate change, and drug resistance.¹⁰ Nurses are essential in caring for the victims of infectious disease pandemics. Nurses are traditionally vulnerable to burnout, but a pandemic increases the risk of nurse burnout, and they must be protected from burnout. High levels of nurse burnout could lead to a loss in the nursing workforce that is already experiencing an occupational shortage.¹

PANDEMICS OF THE PAST

Pandemics have affected humans throughout histories, such as the plague, Cholera, influenza, and coronavirus diseases.¹⁰ The Neolithic Revolution (aka, Agricultural Revolution) brought about a shift in human civilization and the way people lived.¹¹ A lifestyle change occurred that soon shifted from nomads hunting and gathering to large settlements of agricultural communities,¹¹ thereby creating prime conditions (ie, closer contact between humans and humans and animals), fostering the growth, and dispersion of pandemics.¹¹ Inadequate sanitation, unsafe water, and infected food supplies intensify the expansion and spread of infectious diseases throughout time. With the development of transportation systems (ships, railways, automobiles, airplanes), disease can spread more easily than at any point in history.¹¹

Plagues

Looking back through history, a virus or a bacterium has caused a pandemic, and one of the first recorded pandemics was the Great Plague of Athens, dated 430 to 426 BC.¹² Falode and colleagues¹² report that this plague originated in Sudan and made its way through Egypt, across the Mediterranean into Persia and Greece. This highly contagious plague killed approximately 100,000 Athenians, as it broke out during the Peloponnesian War (431–403 BC).

During the second century AD, a period when the Roman Empire (encompassing Europe, Africa, Middle East) was thriving until a contagion, believed to be variola virus¹² (ie, smallpox), spread in the late 160s AD to Rome from Seleucia¹³ following the army's return from war.^{12,14} The Antonine Plague ended in 180 AD and killed 5 million people in its path.^{12,15}

The first bubonic plague recorded in circa 541 to 543 AD was named the Plague of Justinian.^{10,12,15} This plague differed from the previous plagues, as it was zoonotic, meaning transmission from animal to human,¹² and was caused by the bacterium *Yersinia pestis*.¹⁰ Mainly found in rats and adult fleas, the bacterium is transmitted to animal hosts and between hosts, including humans when bitten by infected fleas.^{10,12,15,16} Plagues can lay dormant for some time and return years later and with a vengeance. In 1345 AD the bubonic plague, known as the Black Death,¹⁵ emerged and by 1353 AD, the worldwide death toll was 200 million, which encompassed nearly half of Europe's population.^{10,11,13–15} In 1894, it emerged in China and dispersed through flea-infested rats, causing more than 12 million deaths worldwide within 10 years.¹⁷

As devastating as the plagues were, some positive outcomes resulted, such as institutional action to disease control, which included improved quarantine methods and better sanitation.^{10,15} Scientific discoveries such as the bacillus is responsible for the plague and the culprit (fleas) in transmission by Alexandre Yersin in 1894.^{10,13}

Cholera

For well over a millennium, Cholera has made its name known. This acute, and at times fatal, disease¹⁰ began with the first wave, originating in India in 1817. After that, it got spread to other parts of the world via feces, contaminated water, or food (ie, seafood)¹³ and continues to present itself, with the seventh wave occurring even until this day.^{10,15} Caused by *Vibrio cholerae*, this has caused deaths in more than a million people.¹⁰ In 2019, the World Health Organization (WHO)¹⁸ estimated that 1.3 to 4 million people contract Cholera annually, and up to 143,000 deaths, caused by Cholera, occur worldwide.

Influenza

In the nineteenth, twentieth, and early twenty-first century, the WHO declared several flu pandemics. Beginning with the Russian Flu in 1889 and by most accounts ending in 1890,^{13,15} this influenza virus emerged in St. Petersburg, Russia¹³ and spread to large portions around the globe secondary to an increase in world population and transportation networks (ie, railways, canals, roads).^{10,13,15} The worldwide fatality rate resulting from the Russian Flu is estimated at 1 million people.^{10,15}

During the start of the twentieth century, The Spanish Flu emerged in 1918, and although it lasted only a year, it went down in the record books as one of the most severe pandemics in history.^{11–13} Infecting an estimated 500 million people around the globe, mainly between the ages of 1 and 60 years, it had the highest impact of morbidity (50 million) occurring in the healthy young adult population (age 20–40 years).^{10,13,15}

The next pandemics, both the Asian Flu (1957–1958), which originated in Singapore,¹³ and the Hong Kong Flu (1968–1970), which originated in Hong Kong, involved a new strain of the influenza type A virus (H2N2 and H3N2, respectively).^{10,13,15} Finally, the last influenza pandemic now known as the H1N1pdm09, the Swine Flu (zoonotic, pigs to human, then through humans) likely originated in Mexico.

Coronavirus

The National Foundation of Infectious Diseases¹⁹ and the Centers for Disease Control²⁰ report coronaviruses, named for crownlike spikes on their surface, are often circulating among animals (eg, camels, cats, and bats) and are viruses that can evolve and infect people. Coronaviruses can cause various signs and symptoms in animals and humans. For example, in cows and pigs, the virus can cause diarrhea; however, in humans it causes mild respiratory infections such as a sore throat, cough, or nasal congestion.^{19,20} In the 1960s, human coronaviruses were identified.^{19,20} Although there are hundreds of coronaviruses, currently only 7 human coronaviruses can affect people and can be categorized into 2 groups. The first group, common human coronaviruses, includes 229E alpha CoV, NL63 alpha CoV, OC43 beta CoV, and HKU1 beta CoV.²⁰ Namely, these pathogens typically cause mild upper respiratory tract infections, such as the common cold or pharyngitis.²¹ The second group, known as other human coronaviruses, originated as animal infections that evolved over time and transmitted to humans.²⁰ These coronavirus pathogens include Middle East respiratory syndrome (MERS-CoV), SARS-CoV, and lastly, the novel coronavirus, an infectious disease representing a newly identified strain (2019-nCoV, a.k.a. SARS-CoV-2).^{20,21} These pathogens also affect people and cause more severe lower respiratory tract infections/illnesses (eg, pneumonia, acute bronchitis).²¹ Lastly, primary symptoms of SARS-CoV-2C are fever, shortness of breath, cough, loss of taste, or smell.²²

To this end, history taught us that plagues, cholera, influenza, and coronavirus pandemics know no borders, and every continent, country, state, city, and community around the world are susceptible; moreover, not out of danger. Sadly, history has shown that in time pandemics repeat themselves. Looking at the lessons learned from past pandemics and taking them forward to positively affect the potential course one of them might have on the world as we know it is essential to the future of the whole human race.

RESPIRATORY PANDEMICS AND NURSE BURNOUT

Respiratory infections are especially virulent because the spread of the infectious agents are by droplets and interpersonal contact.¹ Nurses are in close contact with patients afflicted with pandemic diseases and are on the frontlines of the health care response, making them vulnerable to stressful environments.¹ Because influenza and coronavirus diseases are the most virulent, putting nurses at the highest risk, the authors discuss these pandemics and how they affect nurse burnout as reported in the literature.

Nurse Burnout Related to Influenza Pandemics

Zangaro and colleagues⁹ systematic review articles that screened articles from 2000 to 2019 for nurse burnout as measured by the entire MBI-HSS were further screened for articles related to influenza pandemics. Keywords used were "pandemic," "influenza," "Spanish flu," "avian flu," "bird flu," "Hong Kong flu," and "swine flu." This search produced no articles that met this criterion. In an attempt to find related

literature, a search was then done on *Google Scholar* using the exact keywords, and only one peer-reviewed article was found related to nurse burnout. Usher and colleagues²³ addressed the H1N1 Swine flu but did not address nurse burnout, only discussing the potential to place greater demands on health services in tropical and rural regions of Australia.²³

Coronavirus Pandemics

Coronaviruses are positive-sense, single-stranded RNA viruses and can affect humans and many species of animals.²⁴ Alpha-coronavirus genes are responsible for the common cold, and the beta-coronavirus causes more severe respiratory infections.²⁴ The beta-coronavirus includes highly pathogenic viruses that cause SARS-CoV, MERS-CoV, and SARS-CoV-2 (also known as COVID-19).²⁵

The SARS-CoV was considered an epidemic and originated in Guangdong province (China) in 2003, where bats were likely responsible for passing it to humans.²⁶ It spread to 29 countries with 813 related fatalities.²⁷ MERS-CoV was reported 10 years after SARS-CoV in Saudi Arabia. It is believed that bats and camels spread the virus to humans.²⁸ MERS-CoV has resulted in 866 deaths in 27 countries.²⁷ The SARS-CoV-2 pandemic was first reported in December 2019 in Wuhan, China.²⁹ As of June 2021, there have been 3,899,172 deaths reported to WHO.³⁰

Nurse Burnout Related to Coronavirus Pandemics

The articles in the Zangaro and colleagues⁹ systematic review were additionally filtered for coronavirus pandemics SARS-CoV, MERS-CoV, and SARS-CoV-2. Keywords used were "pandemic," "influenza," "SARS-CoV," "MERS-CoV," "SARS-CoV-19," "COVID-19," and "Coronavirus." The authors found no studies that met these criteria. A search was done on *Google Scholar* using the exact keywords but searched in years 1960 to 2021. The authors only found one article that was related to nurse burnout during SARS-CoV.

Marjanovic and colleagues³¹ was the only article found that related nurse burnout to a coronavirus pandemic before 2020. However, only the emotional exhaustion portion of the MBI was used to test for burnout, as it correlates with psychosocial variables. There were 333 nurses who were surveyed during the 2003 SAR-CoV crisis in Canada. The authors found significant positive correlations between emotional exhaustion and measures of anger, avoidance behavior, contact with patients with SARS, and time spent in quarantine. Negative correlations were found between emotional exhaustion as compared with vigor, organizational support, and trust in infection control initiatives.³¹ The authors conclude that preparedness and efficacy to manage a pandemic crisis should be a priority. Teaching nurses new working strategies to prevent burnout and helping nurses reduce feelings of uncertainty and fear can benefit crisis management.³¹

Nurse Burnout Related to Current Coronavirus Pandemic

The authors then searched *Google Scholar* using keywords "nurses," "pandemic," "burnout," "MBI," "OBI," "COVID-19," and "SARS-CoV-2." Combinations of keywords resulted in many narrative reviews, qualitative studies, commentaries, and study protocols, which were not considered in this report. Studies that reported statistics on burnout in nurses were included in this report (**Table 1**). Fourteen studies were found that used the MBI or portions of the MBI to report nurse burnout,^{2,32-44} 1 used the Spanish Burnout Inventory,⁴⁵ 1 used the Copenhagen Burnout Inventory, and 3 used the Oldenburg Burnout Inventory (OBI).⁴⁶⁻⁴⁸

Table 1
Articles on nurse burnout during the COVID-19 pandemic

Article Citation	Measurement	Sample Size Nurses	Country	Setting	Findings
Lasalvia et al, ² 2021	MBI-GS	687	NE Italy	Tertiary hospital nurses	They found that 49% of nurses displayed emotional exhaustion and were at a higher risk of burnout than other health care workers.
Huo et al, ³² 2021	MBI-GS	526	China	Frontline nurses	Researchers found that 42.5% of nurses in their study had burnout in China. Young and less experienced should receive more attention.
Wan et al, ³³ 2020	MBI-GS	1011	Wuhan, China	Tertiary hospital	Found anxiety is serious but only mild to medium burnout. Note that Wuhan saw COVID-19 pneumonia patients starting in December 2019 and this study was done in February 2020 (only 2 mo later).
Lasater et al, ³⁴ 2020	MBI-HSS	4298	US-NY and Ill	Med-Surg compared with ICU	Higher burnout in med-surg nurses (53.1%) than intensive care nurses (ICU) (46.9%). Lasater et al. pointed out that nurses working in understaffed conditions before the pandemic and understaffing conditions only worsened with the pandemic.

Bruyneel et al, ³⁵ 2021	MBI-HSS	1135	Belgium	ICU	More than 68% were at risk of burnout during the first wave of COVID-19. Interestingly, this study also showed that those who perceived having a higher workload had a higher risk of burnout in all dimensions of the MBI.
Hu et al, ³⁶ 2020	MBI-HSS	2014	Wuhan, China	Frontline nurses	Chinese version of the entire MBI-HSS was used and found that about half of the nurses reported moderate and high work burnout.
Wu et al, ³⁷ 2020	MBI-HSS	190	Wuhan, China	Frontline compared oncology unit ward nurses	Interestingly, burnout was significantly lower in the nurses working frontline (13%) when compared with the nurses working on the unit ward (38%). The reasoning given was that perhaps frontline nurses felt more prepared with information, whereas the nurses working on the unit ward were less informed.
Guixia et al, ³⁸ 2020	MBI-HSS	92	China	ICU compared with general ward nurses	A third study done in China found the opposite results as Wu et al. when looking at the prevalence of burnout compared with frontline ICU nurses working on general wards. An almost double number of ICU nurses (89.57%) compared general ward nurses (49.15%) with moderate to high burnout. The difference may be due to the first group working with highly vulnerable oncology patients.

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Table 1
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Article Citation	Measurement	Sample Size Nurses	Country	Setting	Findings
Jose et al, ³⁹ 2020	MBI-HSS	120	North India	ED	54% had moderate to severe levels of burnout. The researchers also found a negative correlation between burnout and resilience, in that as resilience scores were higher, burnout scores were lower.
Kakeman et al, ⁴⁰ 2021	MBI-HSS	1004	Iran	Nurses who work FT in hospitals >1 y	31.5% reported "high" burnout. A positive correlation was found between emotional exhaustion and depersonalization scores and patient care quality, whereas a negative correlation was found between personal accomplishment scores and all poor care item scores. Personal accomplishment reduced the risk of occurrence of "medication errors" (OR = 0.99) and the onset of "patient and their family verbal abuse" (OR = 0.97).
Jalili et al, ⁴¹ 2021	MBI-HSS	300	Tehran, Iran	Nurses in contact with COVID-19 patients	55% experiencing high levels of burnout.

Murat et al, ⁴² 2021	MBI-HSS	705	Istanbul, Turkey	Front-line nurses at hospitals	High burnout was found. "...nurses who did not feel sufficient about the nursing care experienced personal accomplishment burnout, those who worked in public hospitals and tested positive for COVID-19 experienced depersonalization burnout, and also male nurses who worked in public hospitals and tested positive for COVID-19 experienced emotional exhaustion burnout. However, it was observed that Bachelor's graduates, those who had worked for between 1 and 10 y, and nurses who did not want to work voluntarily during the pandemic had higher scores from the sub dimensions of the MBI (personal accomplishment, emotional exhaustion, depersonalization); in other words, they were more negatively affected."
Galanis et al, ⁴³ 2021	MBI-HSS	18,935	Systematic review of 16 articles China, Turkey, Italy, Singapore, Puerto Rico, UK, India, Iran, Spain, Japan, USA, Spain	Nurses working during COVID-19 pandemic	Overall, the study reported emotional exhaustion was 34.1%, depersonalization was 12.6%, and lack of personal accomplishment was 15.2%. High scores on emotional exhaustion (>20) and depersonalization (>10) and low scores on personal accomplishment (<25) indicate burnout. (Maslach et al., 1996).

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Table 1
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Article Citation	Measurement	Sample Size Nurses	Country	Setting	Findings
					These findings would be in agreement with most of the conclusions of the articles reviewed here.
Prasad et al, ⁴⁴ 2021	MBI-one question	5027	US	Nurses working during COVID-19 pandemic	A national survey only asked one question from the MBI about burnout and found 53.87% had burnout
Garcia et al, ⁴⁵ 2021	Spanish Burnout Inventory	771	Spain	Nurses working in hospitals during COVID-19 pandemic	"The perceived threat of COVID-19 positively correlates with burnout (0.68; $P < .01$). This correlation is the highest between burnout and the variables used to explain it"
Chor et al, ⁵³ 2020	Copenhagen Burnout Inventory	210	Singapore	ED and urgent care nurses	53.3% were experiencing burnout during the pandemic.
Hoseinabadi et al, ⁴⁶ 2020	OBI	245	Iran	151 frontline nurses compared with 94 nurses not exposed to COVID-19 patients	Frontline nurses scored 2.57 out of 5 and nonexposed nurses scored 2.51
Horta et al, ⁴⁷ 2021	OBI	123	Brazil	Frontline nurse	60% were exhausted, with 41% experiencing burnout.

Bellanti et al, ⁴⁸ 2021	MBI OBI	293	Italy	Frontline nurses	This study compared the MBI scores with OBI scores. The MBI reported moderate/high emotional exhaustion in 76.5%, depersonalization in 50.2%, and personal gratification in 54.6% of participants. Compared with the OBI, which resulted in medium/high burnout in 89.1% of participants. ⁴⁸ Pearson's correlations of the MBI and OBI and the sub-dimensions found exhaustion detected by MBI or OBI showed 50% agreement, with 197 (67.2%) of participants with a high level of exhaustion on both tools.
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Abbreviations: GS, General Survey; HSS, Human Services Survey; MBI, Maslach Burnout Inventory; OBI, Oldenburg Burnout Inventory.

Based on these findings, nurse burnout was not well researched during past pandemics. However, there is evidence that nurse burnout is moderate to high under normal circumstances. Current research does show overwhelming evidence that nurse burnout has increased during the COVID-19 pandemic.

PRELIMINARY RESULTS OF A STUDY ON NURSE BURNOUT DURING COVID-19

In this section, the authors report on their own cross-sectional, online survey study preliminary findings. This study was carried out from April 7, 2020, to January 15, 2021, when COVID-19 first hit the United States. Included are data from nurses in 48 states (no data were obtained from nurses in Utah and Alaska) and 2 other countries. The purpose of this study was to examine the mental health of nurses during the COVID-19 pandemic. It was hypothesized that there would be higher rates of adverse mental health outcomes due to staffing shortages, increased stress due to the fear of contracting COVID-19, and low amounts of support and protection, among other reasons. Participants in this study were administered several standardized measures of 4 aspects of mental health (depression, anxiety, trauma, and burnout) via an online survey. The finding from the burnout measure will be reported in the following discussion.

In the authors' study the Oldenburg Burnout Inventory (OBI)⁴⁹ was administered to measure nurse burnout, as it is a free public domain instrument. It has been validated as a reliable instrument.^{50,51} In their study, the OBI was administered to 1364 nurses working during the COVID-19 pandemic as part of this online survey. The OBI is a 16-item measure of 2 dimensions of burnout scored by a 4-point scale ranging from 1 (strongly agree) to 4 (strongly disagree). All scores were reversed (except for reverse scoring items) so that higher scores indicated more burnout. The OBI measures 2 dimensions of burnout, exhaustion, and disengagement from work. These 2 dimensions have been found to have a moderate-to-high correlation with the emotional exhaustion and depersonalization scales of the Maslach Burnout Inventory ($r = .716$ and $r = .550$, respectively) (Bellanti). For this analysis, a cutoff score of greater than or equal to 2.25 was used to determine exhaustion on the OBI, and a cutoff score of greater than or equal to 2.1 was used to determine disengagement on the OBI, as recommended by Peterson and colleagues⁵² in their study on 3719 health care workers.

The authors removed 327 participants from this dataset due to partial or incomplete OBI scores ($n = 1037$). Demographics for the 1037 nurses are listed as follows:

- The participants were 92% women and 8% men
- Highest percentage of age groups were 55 to 64 years at 27%, 45 to 54 years at 24%, and 35 to 44 years at 21%.
- Highest degree earned: Associate Degree 17%, BSN 52%, Masters 25%, Doctorate 6.7%
- 39% were nursing students
- Employment: clinic was 11%, hospital was 55%, and other 34%
- Location of hospital: urban 55%, suburban 32%, rural 14%
- Location of residence: urban 17%, suburban 56%, rural 27%
- Participants were represented from every US state except Alaska.
 - 1 participant from Puerto Rico
 - Top 2 states represented was Florida with 19% and New York with 18%
- International participants included: Canada 4, United Kingdom 2, and one from each of the following countries: Bahamas, Nepal, South Africa, South Korea, United Republic of Tanzania, and Zimbabwe.

Based on these recommended cutoff scores, we found that 705 (68.0%) nurses in this dataset met the criteria for the exhaustion dimension of burnout, and 916 (88.3%) nurses met the criteria for the disengagement dimension of burnout. To further examine contributors to burnout in nurses during the COVID-19 pandemic, we correlated the burnout scores with demographic variables, asking whether the nurse was working on the frontlines of the pandemic and a set of questions about possible contributing factors to burnout during the pandemic. Because of the nature of the response options for some questions, Spearman's r was calculated instead of Pearson's r . All statistical tests use a .05 significance, and all were done in a two-tailed fashion. Responses to these questions were not required for participation, and therefore, not all participants who completed the OBI completed the demographics, frontline question, or contributing factors questions. The varied responses led to different sample sizes for these questions; these n values are shown in the last column of the following tables.

Results from the demographic variables and the full-scale OBI are presented in **Table 2**. Significant, negative correlations were found for age, education, and level of contact with patients with COVID-19 (frontline workers). A significant, positive correlation was identified between burnout and whether or not the nurse is a current degree-seeking student. Based on Cohen's recommendations for the strength of a correlation, the demographic variable "age" showed a weak, negative correlation ($r = -.298$).⁵⁴ However, although other variables were significant, they were not strong relationships, according to these recommendations.⁵⁴

Near the end of the online survey, we asked a series of questions related to possible contributing factors to mental health and burnout, specific to the pandemic. For the full-scale OBI, we found positive, significant correlations for the first question, "Estimate what capacity your hospital is at right now" (capacity), the second question, "Do you feel that there is a shortage of personal protective equipment (PPE) at your hospital?" (PPE), and the fifth question "Are you working overtime due to the COVID-19 pandemic?" (overtime). We found negative, significant correlations for the third question "How staffed do you feel your institution is?" (staffed feel), the fourth question "Do you feel that your institution is adequately staffed?" (staffed adequate), and the eighth question "Do you feel that you are being adequately paid for your work?" (adequate pay). Based on Cohen's recommendations for the strength of a correlation, questions 3 (staffed feel), 4 (staffed adequate), and 8 (adequate pay) showed weak, negative correlations ($r = -.304$, $r = -.266$, and $r = -.280$, respectively).⁵⁴

The authors also examined the association between these questions and the exhaustion and disengagement subscales of the OBI (**Table 3**). They found significant,

Demographic Variable	Spearman's r_s	P-value	n
Age	-.298^a	.000	1036
Gender	.026	.413	1032
Education	-.081^a	.009	1034
Current Student	.142^a	.000	1031
Marital Status	.061	.051	1037
Level of contact with COVID-19 patients/ frontline worker	-.170^a	.000	1037

Bold values are significant.

^a Significant at the .001 level.

Table 3
Correlations between contributing factors during the COVID-19 pandemic and burnout

Hospital Measure	Spearman's <i>r_s</i>	<i>P</i>-value	<i>n</i>
<i>Full-Scale</i>			
1. Estimate what capacity your hospital is at right now.	.073 ^a	.033	855
2. Do you feel that there is a shortage of personal protective equipment (PPE) at your hospital?	.224 ^b	< .001	810
3. How staffed do you feel your institution is?	-.304 ^b	< .001	921
4. Do you feel that your institution is adequately staffed?	-.266 ^b	< .001	835
5. Are you working overtime due to the COVID-19 pandemic?	.172 ^b	< .001	980
6. Estimate how many hours of overtime you are working.	.077	.157	338
7. Are you being paid overtime wages for your overtime work?	.035	.519	334
8. Do you feel that you are being adequately paid for your work?	-.280 ^b	< .001	869
<i>Exhaustion</i>			
1. Estimate what capacity your hospital is at right now.	.095 ^a	.006	855
2. Do you feel that there is a shortage of personal protective equipment (PPE) at your hospital?	.234 ^b	< .001	810
3. How staffed do you feel your institution is?	-.293 ^b	< .001	921
4. Do you feel that your institution is adequately staffed?	-.254 ^b	< .001	835
5. Are you working overtime due to the COVID-19 pandemic?	.205 ^b	< .001	980
6. Estimate how many hours of overtime you are working.	.078	.150	338
7. Are you being paid overtime wages for your overtime work?	.031	.577	334
8. Do you feel that you are being adequately paid for your work?	-.251 ^b	< .001	869
<i>Disengagement</i>			
1. Estimate what capacity your hospital is at right now.	.042	.216	855
2. Do you feel that there is a shortage of personal protective equipment (PPE) at your hospital?	.180 ^b	< .001	810
3. How staffed do you feel your institution is?	-.265 ^b	< .001	921

4. Do you feel that your institution is adequately staffed?	-.238^b	< .001	835
5. Are you working overtime due to the COVID-19 pandemic?	.115^b	< .001	980
6. Estimate how many hours of overtime you are working.	.073	.183	338
7. Are you being paid overtime wages for your overtime work?	.043	.432	334
8. Do you feel that you are being adequately paid for your work?	-.259^b	< .001	869

Bold values are significant.

^a Significant at the .05 level.

^b Significant at the .001 level.

positive correlations between questions 1 (capacity), 2 (PPE), and 5 (overtime work) and the exhaustion subscale. Significant, negative correlations between the exhaustion subscale and questions 3 (staffed feel), 4 (staffed adequate), and 8 (adequate pay) were identified. Significant, positive correlations were found between questions 2 (PPE) and 5 (overtime work) and the disengagement subscale. Significant, negative correlations between the disengagement subscale and questions 3 (staffed feel), 4 (staffed adequate), and 8 (adequate pay) were identified. Based on Cohen's recommendations, questions 3 (staffed feel), 4 (staffed adequate), and 8 (adequate pay) showed weak, negative correlations with the exhaustion subscale ($r = -.293$, $r = -.254$, and $r = -.251$, respectively), and questions 3 (staffed feel) and 8 (adequate pay) showed weak, negative correlations with the disengagement subscale ($r = -.265$ and $r = -.259$, respectively).⁵⁴ These results are similar to the findings for the full-scale OBI, and these findings are discussed in terms of overall burnout. Because of the nature of the scoring of this scale, the authors thought it was beneficial to observe these relationships in terms of these subscales as well.

Weak, negative associations were found between the questions 3 (staffed feel) and 4 (staffed adequate) and 8 (adequate pay). Nurses working during the COVID-19 pandemic who felt that their institution was more staffed experienced less burnout than those who reported that their institution was understaffed. Likewise, nurses who felt that their institution was adequately staffed were less burned out than those who felt that their institution was not adequately staffed. Lastly, nurses who felt that they were adequately paid for their work during the COVID-19 pandemic were experiencing less burnout, and those who did not feel that they were adequately paid were more burned out. Adequate hospital staffing is an environmental stressor that has been shown to affect burnout in nurses in several other studies.⁵⁵ It was expected that there is a more robust correlation during the COVID-19 pandemic, but these results show that adequate staffing is a problem for nurse burnout during the COVID-19 pandemic. Another study that investigated pay and burnout found that wage was associated with job dissatisfaction and intent to leave but only had a small effect on burnout.⁵⁶ The relationship between pay and burnout in this study is weak, but it suggests that nurses who do not feel they are being adequately paid for the increase in work due to the pandemic experience more burnout.

SUMMARY

Global pandemics present a unique challenge to nurses who already show high rates of burnout.⁵⁷ This topic is of considerable interest at the present time because of the incredible demand that has been placed on nurses during the COVID-19 pandemic. In the authors' literature review, they found that nurses experience high rates of burnout when working under normal circumstances, but even higher rates of burnout are being reported during the COVID-19 pandemic.² In a study conducted by the authors of this article, nurses are experiencing high rates of burnout during the COVID-19 pandemic. The 2 dimensions measured by the OBI have moderate to high correlations with the emotional exhaustion and depersonalization scales of the MBI ($r = 0.716$ and $r = 0.550$, respectively).⁴⁹ The MBI is considered the "gold standard" tool for measuring burnout and was used in several studies mentioned in this article, where high rates of burnout are also reported.^{2,32-44} In the authors study, 68.0% of nurses met criteria for the exhaustion dimension, and 88.3% of nurses met criteria for the depersonalization dimension.

In the study conducted by the authors of this article, there were some contributing factors to burnout, which other studies have supported, such as job stress,^{44,46,48}

inadequate staffing,³⁴ and inadequate pay for the work performed.⁵⁶ However, the findings from the authors' study are even higher than has been reported in other studies. When combined with findings from other studies, these results provide evidence that nurses need additional support during global pandemics to decrease burnout and combat its adverse consequences, such as poor quality of patient care, nurse turnover, and negative consequences for the nurse's health.

Literature has suggested that health care organizations can support their nurses and lower burnout by addressing these factors and creating policies to protect nurses.^{34,36} Health care organizations should monitor nurses for risk of burnout.^{35,58–60} Studies performed during the COVID-19 pandemic and other pandemics have found various ways to support nurses and decrease burnout such as teaching nurses new strategies to protect their well-being.^{1,60,61} These strategies include mindfulness training,^{60,62,63} self-care techniques,⁴⁰ access to psychosocial and psychological support,^{40,42,47,48} prioritizing rest and breaks,⁴⁷ and meditation apps.⁶² Preventing burnout and supporting nurses to reduce feelings of uncertainty and fear³² can benefit crisis management during pandemics.^{31,64}

In conclusion, this literature review and the authors' research confirmed that nurses are experiencing high levels of burnout during the COVID-19 pandemic and suggest that health care organizations need to support nurses by creating policies to protect nurses, monitoring nurses for signs and symptoms of burnout, and helping nurses to implement strategies to protect their well-being.

CLINICS CARE POINTS

- Health care organizations should support nurses by implementing interventions to protect their well-being.
- Nurses should be monitored for risk of burnout.
- Policies should be written to protect nurses from inadequate staffing and prioritizing rest and breaks.

DISCLOSURE

The authors have nothing to disclose.

REFERENCES

1. Fernandez R, Lord H, Halcomb E, et al. Implications for COVID-19: a systematic review of nurses' experiences of working in acute care hospital settings during a respiratory pandemic. *Int J Nurs Stud* 2020;111:103637.
2. Lasalvia A, Amaddeo F, Porru S, et al. Levels of burn-out among healthcare workers during the COVID-19 pandemic and their associated factors: a cross-sectional study in a tertiary hospital of a highly burdened area of north-east Italy. *BMJ Open* 2021;11:e045127.
3. Kok N, van Gorp J, Teerenstra S, et al. Coronavirus disease 2019 immediately increases burnout symptoms in ICU professionals: a longitudinal cohort study. *Crit Care Med* 2021;49(3):419–27.
4. Poghosyan L, Aiken LH, Sloane DM. Factor structure of the Maslach burnout inventory: an analysis of data from large scale cross-sectional surveys of nurses from eight countries. *Int J Nurs Stud* 2009;46(7):894–902 [Erratum appears in *Int J Nurs Stud*. 2014 Oct;51(10):1416-7].

5. Freudenberger HJ. Staff burnout. *J Soc Issues* 1974;30:159–65.
6. Freudenberger HJ, Richelson GI. *Burn-out: the high cost of high achievement*. New York: Anchor Pres, Doubleday & Company, Inc; 1980.
7. Maslach C, Jackson SE. The measurement of experienced burnout. *J Organ Behav* 1981;2:99–113.
8. Maslach C. *Burnout: the cost of caring*. Englewood Cliffs (NJ): Prentice Hall; 1982.
9. Zangaro G, Dulko D, Sullivan D, et al. Systematic review of burnout in U.S. nurses. 2022: In print.
10. Piret J, Boivin G. Pandemics throughout history. *Front Microbiol* 2021;11:631736.
11. Moore J. Pandemics and plagues: teaching history's biggest killers. *Ohio Social Stud Rev* 2020;56(2):5–21. Available at: <https://ossr.scholasticahq.com/article/17365-pandemics-and-plagues-teaching-history-s-biggest-killers>. Accessed July 1, 2021.
12. Falode A, Yakubu M, Bolarinwa O. History of pandemics in the twentieth and twenty-first century. *Sineza* 2021;2(1):9–26.
13. Turner JA. Pandemics and epidemics through history: this too shall pass. *J Hosp Librariansh* 2020;20(3):280–7.
14. Bower B. Past plagues offer lessons for society: starting with the Roman Empire, societies have often been resilient through deadly outbreaks. *Sci News* 2020; 197(11):24–7. Available at: <https://www.sciencenews.org/article/coronavirus-covid-19-ancient-plagues-pandemics-lessons-society>. Accessed July 1, 2021.
15. Dasgupta S, Crunkhorn R. A history of pandemics through the ages and the human cost. *The Physician* 2020;6(2):1–9.
16. Ditchburn J-L, Hodgkins R. *Yersinia pestis*, a problem of the past and a re-emerging threat. *Biosaf Health* 2019;1(2):65–70.
17. World Health Organization [WHO]. WHO report on global surveillance of epidemic-prone infectious diseases. Available at: <https://www.who.int/csr/resources/publications/surveillance/plague.pdf>. Accessed July 1, 2021.
18. World Health Organization [WHO]. Cholera fact sheet. Available at: <https://www.who.int/news-room/fact-sheets/detail/cholera>. Accessed July 5, 2021.
19. National Foundation of Infectious Diseases. Coronaviruses. Available at: <https://www.nfid.org/infectious-diseases/coronaviruses/>.
20. Centers for Disease Control [CDC]. Human coronavirus types. Available at: <https://www.cdc.gov/coronavirus/types.html>. Accessed July 6, 2021.
21. Liu DX, Liang JQ, Fung TO. Human Coronavirus-229E, -OC43, -NL63, and -HKU1 (Coronaviridae). *Encyclopedia Virol* 2021;3:428–40.
22. Center for Disease Control. [CDC]. Symptoms of COVID-19. Available at: <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>. Accessed July 5, 2021.
23. Usher K, Gardner A, Buttner P, et al. The H1N1 influenza 09 and its potential impact on the Australian nursing workforce. *Collegian* 2009;16(4):169–70.
24. Kahn JS, McIntosh K. History and recent advances in coronavirus discovery. *Pediatr Infect Dis J* 2005;24:S223–7 [discussion: S226].
25. Song Z, Xu Y, Bao L, et al. From SARS to MERS, thrusting coronaviruses into the spotlight. *Viruses* 2019;11:59.
26. Guan Y, Zheng BJ, He Y, et al. Isolation and characterization of viruses related to the SARS coronavirus from animals insouthern China. *Science* 2003;302(276): 276–8.

27. World Health Organization [WHO]. Cumulative number of reported probable cases of SARS. 2003. Available at: <https://www.who.int/news-room/fact-sheets/detail/plague>.
28. Conde R, Grant R, Malik MR, et al. Reported direct and indirect contact with dromedary camels among laboratory-confirmed MERS-CoV cases. *Viruses* 2018;10:425.
29. Lau SKP, Luk HKH, Wong ACP, et al. Possible bat origin of severe acute respiratory syndrome coronavirus 2. *Emerg Infect Dis* 2020;26:1542–7.
30. World Health Organization [WHO]. WHO Coronavirus Disease (COVID-19) Dashboard. 2021. Available at: <https://covid19.who.int/>. Accessed July 19, 2021.
31. Marjanovic Z, Greenglass ER, Coffey S. The relevance of psychosocial variables and working conditions in predicting nurses' coping strategies during the SARS crisis: An online questionnaire survey. *Int J Nurs Stud* 2007;44(6):991–8.
32. Huo L, Zhou Y, Li S, et al. Burnout and its relationship with depressive symptoms in medical staff during the COVID-19 epidemic in China. *Front Psychol* 2021;12: 616369.
33. Wan Z, Lian M, Ma H, et al. Factors associated with burnout among Chinese nurses during COVID-19 epidemic: a cross sectional study. *Res Square* 2020. <https://doi.org/10.21203/rs.3.rs-31486/v1>.
34. Lasater KB, Aiken LH, Sloane DM, et al. Chronic hospital nurse understaffing meets COVID-19: an observational study. *BMJ Qual Saf* 2020;0:1–9.
35. Bruyneel A, Smith P, Tack J, et al. Prevalence of burnout risk and factors associated with burnout risk among ICU nurses during the COVID-19 outbreak in French speaking Belgium. *Intensive Crit Care Nurs* 2021;65:103059.
36. Hu D, Kong Y, Li W, et al. Frontline nurses's burnout, anxiety, depression, and fear statuses and their associated factors during the COVID-19 outbreak in Wuhan, China: A large-scal cross-sectional study. *EClinicalMedicine* 2020;24:100424.
37. Wu Y, Wang J, Luo C, et al. A comparison of burnout frequency among oncology physicians and nurses working on the frontline and usual wards during the COVID-19 Epidemic in Wuhan, China. *J Pain Symptom Manage* 2020;60(1): e60–5.
38. Guixia L, Hui Z. A Study on burnout of nurses in the period of COVID-19. *Psychol Behav Sci* 2020;9(3):31–6.
39. Jose S, Dhandapani M, Cyriac MC. Burnout and resilience among frontline nurses during COVID-19 pandemic: A cross-sectional study in the emergency department of a tertiary care center, North India. *Indian J Crit Care Med* 2020; 24(11):1081–8.
40. Kakemam E, Chegini A, Rouhi A, et al. Burout and its relationship to self-reported quality of patient care and adverse events during COVID-19: A cross-sectional online survey among nurses. *J Nurs Manag* 2021;00:1–9.
41. Jalili M, Niroomand M, Hadavand F, et al. Burnout among healthcare professionals during COVID-19 pandemic: a cross-sectional study. *Int Arch Occup Environ Health* 2021. <https://doi.org/10.1007/s00420-021-01695-x>.
42. Murat M, Kose S, Savaser S. Determination of stress, depression and burnout levels of front-line nurses during the COVID-19 pandemic. *Int J Ment Health Nurs* 2021;30:533–43.
43. Galanis P, Vraka I, Fragkou D, et al. Nurses' burnout and associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *J Adv Nurs* 2021;77(8):3286–302.

44. Prasad K, McLoughlin C, Stillman M, et al. Prevalence and correlates of stress and burnout among U.S. healthcare workers during COVID-19 pandemic: A national cross-sectional survey study. *EClinicalMedicine* 2021;35:100879.
45. Garcia GM, Calvo JCA. The threat of COVID-19 and its influence on nursing staff burnout. *J Adv Nurs* 2021;77:8323–844.
46. Chor WPD, Ng WM, Cheng L, et al. Burnout amongst emergency healthcare workers during COVID-19 pandemic: a multi-center study. *Am J Emerg Med* 2020. <https://doi.org/10.1016/j.ajem.2020.10.040>.
47. Hoseinabadi TS, Kakhki S, Teimori G, et al. Burnout and its influencing factors between frontline nurses and nurses from other wards during the outbreak of Coronavirus Disease (COVID-19) in Iran. *Invest Educ Enferm* 2020;38(2):e03.
48. Horta RL, Camargo EG, Barbosa MLL, et al. Front line staff nurses and mental health during COVID-19 pandemic in a general hospital. *J Bras Psiquiatr* 2021; 70(1). <https://doi.org/10.1590/0047-2085000000316>.
49. Bellanti F, Lo Buglio A, Capuano E, et al. Factors related to nurses' burnout during the first wave of Coronavirus Disease-19 in a University Hospital in Italy. *Int J Environ Res Public Health* 2021;18(10):5051.
50. Demerouti E, Bakker AB, Vardakou I, et al. The convergent validity of two burnout instruments: A multitrait-multimethod analysis. *Eur J Psychol Assess* 2003;19: 12–23.
51. Demerouti E, Mostert K, Bakker AB. Burnout and work engagement: a thorough investigation of the independency of both constructs. *J Occup Health Psychol* 2010;15(3):209–22.
52. Demerouti E, Veldhuis W, Coombes C, et al. Burnout among pilots: psychological factors related to happiness and performance at simulator training. *Ergonomics* 2018. <https://doi.org/10.1080/00140139.2018.1464667>.
53. Peterson U, Demerouti E, Bergström G, et al. Burnout and physical and mental health among Swedish healthcare workers. *J Adv Nurs* 2008;62(1):84–95.
54. Cohen J. *Statistical power analysis for the behavioral sciences*. Burlington (MA): Elsevier Science; 2013.
55. Aiken LH, Clarke SP, Sloane DM. International Hospital Outcomes Research Consortium. Hospital staffing, organization, and quality of care: cross-national findings. *Int J Qual Health Care* 2002;14(1):5–14.
56. McHugh MD, Ma C. Wage, work environment, and staffing: effects on nurse outcomes. *Policy Polit Nurs Pract* 2014;15(3–4):72–80.
57. Bradley M, Chahar P. Burnout of healthcare providers during COVID-19. *Cleve Clin J Med* 2020. <https://doi.org/10.3949/ccjm.87a.ccc051>.
58. Weilenmann s, Ernst J, Petry H. Healthcare workers' mental health during the first weeks of SARS-CoV-2 pandemic in Switzerland-A cross-sectional study. *Front Psychol* 2021;12:594340.
59. Ross J. The exacerbation of burnout during COVID-19: A major concern for nurse safety. *J Post Anesth Nurs* 2020;35(4):439–40.
60. Tunajji HA, Qubaisi MA, Dalkilinc M, et al. Impact of COVID-19 pandemic burnout on cardiovascular risk in healthcare professionals study protocol: A multicenter exploratory longitudinal study. *Front Psychol* 2020;22:571057.
61. Kealy A. While U.S. nurses fight COVID-19 in hospitals they also fight burnout. *J Health Care Finance* 2020. Available at: www.HealthFinanceJournal.com. Accessed July 10, 2021.
62. Janeway D. The role of psychiatry in treating burnout among nurses during COVID-19 pandemic. *J Radiol Nurs* 2020;39:176–8.

63. Luberto CM, Goodman JH, Halvorson B, et al. Stress and coping among health professions students during COVID-19: A perspective on the benefits of mindfulness. *Glob Adv Health Med* 2020;9:1–5.
64. Okediran JO, Ilesanmi OS, Fetuga AA, et al. The experiences of healthcare workers during the COVID-19 crisis in Lagos, Nigeria: A qualitative study. *Germs* 2020;10(4):356–66.