


Major Stressors and Coping Strategies of Frontline Nursing Staff During the Outbreak of Coronavirus Disease 2020 (COVID-19) in Alabama

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Background: Studies suggest that nursing staff during pandemics such as H1N1 Influenza and COVID-19 exhibit higher than usual stress levels due to an increasingly overburdened healthcare system and increasing infection rates. This study aims to investigate the major stressors and coping strategies reported by nurses working directly with potentially infectious patients in Alabama, United States, during the COVID-19 pandemic.

Materials and Methods: A cross-sectional questionnaire study was conducted with nursing staff working in hospital settings in the state. The questionnaire was completed by 109 nurses working in hospitals that treated COVID-19 patients.

Results: Around 71% of the nursing staff were concerned about receiving more COVID-19 patients and exhibited heightened workload-related stress resulting from taking care of infected patients. The study found that most nurses (82%) are stressed about getting their friends and family infected. Overall, younger, less experienced nurses reported more stress levels compared to older, senior-level nurses. Findings suggest that many nurses fail to perceive protective measures as an effective coping strategy, with only 75% reporting problem-solving strategies such as hand washing and wearing a face mask, and only 60% avoiding public transportation and crowded spaces. Findings also suggest a lack of organizational support including psychiatric assistance, with no nurses reportedly seeking psychological therapy.

Conclusion: The COVID-19 pandemic increased the stress level of the nursing staff in Alabama. The study finds that the cases in the state of AL are still increasing dramatically, which can overwhelm the healthcare system and escalate nurse stress levels.

Keywords: pandemic, COVID-19, nurses stress, workload, coping strategies, infection

Background

On December 31st, 2019, the Wuhan Municipal Health Commission reported a novel coronavirus disease (COVID-19) after studying a cluster of cases of pneumonia in Wuhan, China's Hubei Province.¹ Initial studies reported that the virus spread through social interactions with friends and family. This process resulted in the disease rapidly spreading throughout China. By January 13, 2020, cases of COVID-19 were reported in Thailand, marking its first cases of infection outside of China.¹ By March 11, 2020, COVID-19 was declared a pandemic by the World Health Organization (WHO), with over 120,000 cases and 4300 deaths

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reported around the world.² WHO reports that as of October 22, 2020, there are over 40 million confirmed cases worldwide, with over 1 million deaths.²

COVID-19

Coronavirus disease 2019 (COVID-19) is a new disease caused by SARS-CoV-2, a novel coronavirus that humans have not previously seen. The initial data suggests that COVID-19 might be at least five times more lethal than seasonal influenza.³ Common symptoms of COVID-19 include nausea, vomiting, shortness of breath, chest pain, dry cough, and fever.^{1,4} Initial reports of the virus suggest that aging adults and people with autoimmune disorders are the most impacted by this disease; however, COVID-19 has been found to impact all groups of people.^{1,3-9}

WHO reports that the United States (US) has 8,184,788 confirmed cases of COVID-19 infection, and over 200,000 deaths as of October.² Due to the widespread infection rate and the already high ratio of patients to personnel in ICUs, many news reports, politicians, and public health officials are using the capacity of the ICU and other emergency health functions as the litmus test for healthcare shortages.¹⁰⁻¹³

A scoping review seeking to estimate a global number of healthcare workers (HCW) infected or deceased due to the pandemic found 152,888 infections and 1413 deaths reported.⁷ Frontline nurses, due to their daily routine consisting of monitoring and physically assisting multiple severely infectious patients, may be more susceptible to the psychosocial hazards of working with patients with COVID-19.¹⁴⁻²⁴ According to the World Health Organization (WHO), not only are healthcare workers at a higher risk of infection, their transmission of the virus during their time as asymptomatic individuals can amplify the severity of the infection in their healthcare system.²⁵ In the situation report, WHO cites additional hazards for HCWs during this time such as higher workload, psychological distress, fatigue, occupational burnout, and physical and psychological violence.²⁵

In addition to the poor outcomes caused by the loss of productivity, reports suggest that rising infection rates can cause an overwhelming burden on hospital infrastructure.^{26,27} One study found that 20% of patients hospitalized with COVID-19 in a New York hospital were admitted to the ICU and required mechanical ventilation.²⁶ Another study of 21 critically ill patients in Washington State, USA, found that 81% of pneumonia patients with COVID-19 were admitted to the ICU, with 71% of these

patients requiring mechanical ventilation.²⁷ These studies suggest that the burden on hospital capacity is largely placed on the emergency and intensive care units.^{26,27}

Nursing Staff Stress: An Ethical Dilemma

The American Nurses Association's (ANA) Code of Ethics for Nurses with Interpretive Statements (2015) is perceived by most as the nursing profession's standard of best ethical practices in the United States.²⁸ While provision 2 of their code of ethics states that "the nurse's primary commitment is to the patient," provision 5 of the code states that "the nurse owes the same duty to themselves as to others."²⁸ Nursing ethics at the international level create similar confusion regarding the moral implications of nursing during a pandemic. The International Council of Nurses (ICN) International Code of Ethics states that within nursing there is a respect for human rights related to equality in patient healthcare treatment that may feel threatened or at times compromised due to resource shortages felt by ICUs filled overcapacity.²⁹ Turale et al. (2020) provides insights through the experience of one notable emergency room nurse, Melissa Farmer, reporting how nurses in their hospital working 60 hours a week with bruises on their noses from wearing face masks, being informed by physicians about the "difficult decisions that will be made in the coming weeks about whom to resuscitate" due to a lack of ventilators.³⁰ On top of all of this, nursing staff during this time must also screen phone calls from the anxious family members of patients infected with COVID-19 who are not allowed into the hospital to comfort their loved one due to the need to socially distance.³⁰ While both provisions are regarded as non-negotiable ethical standards within their communities, these obligations are found to cause additional job-related burdens on nurse staff during pandemics when nurses must work under extreme conditions to continually care for critically ill infected patients.^{14,22,24,28,29,31,32}

Due to professional obligations to provide patients with the best treatment possible, many nurses may feel the ethical strain of watching patients die due to a lack of ventilators or suffer anxiety from the risk of infecting patients as asymptomatic carriers.^{19-21,28,31,33} Further, nurses struggling to balance their well-being with their sense of professional tasks,^{34,35} or nurses who must work during a pandemic due to financial limitations,^{36,37} may feel additional emotional and psychological effects. From an ethical perspective, nurses may experience moral injury or trauma as they must balance their perceived

responsibility to safeguard patient welfare with the fear and anxiety of risking infection and the spread of the infection outside of the hospital setting.^{31,32}

Adverse Effects of Nursing Staff Stress

The struggle of nurses to maintain their mental and emotional health while providing care to severely ill and infectious patients can create a professionally and ethically compromising position that some nurses are unable to effectively cope with.^{31,33,38} These sentiments have been reported in the news as factors for adverse events such as recent nurse suicides reported in the US³⁹ and Italy.³³ An ICU nurse from West Palm Beach, Florida hospital was found dead from a drug overdose in his car before his shift at work, with his friends and family heavily suggesting that heavy drug use was a coping mechanism for the long shift hours and high emotional stress of watching infectious patients die.³⁹ In Europe, the National Federation of Italian Nurses reported that an ICU nurse in San Gerardo hospital at Monza, near Milan, committed suicide after contracting COVID-19.³³ The National Federation of Italian Nurse report suggests that the nurse committed suicide due to the fear and guilt felt at the idea that she may have amplified the spread of infection in their hospital as an asymptomatic carrier.³³ Previous studies during the 2009 H1N1 Influenza pandemic have shown that nurses suffered from psychological effects due to stress during the epidemic.^{40,41} While the transmission method, infection rate, and mortality rate may vary amongst infections, many notable pandemics such as the 2009 H1N1 influenza have been found to overburden emergency and intensive care functions across states.^{40,41} Further, continuously high levels of stress and long work hours have been linked with substance abuse,³⁸ as well as increased instances of depression⁴² and suicide.³⁷

Investigating Nurse Stressors in Alabama

Madison County reported the first case of COVID-19 in the state of Alabama on March 17th.⁴³ According to the Centers for Disease Control and Prevention (CDC) COVID-19 Case Surveillance Public Use Data, as of November, Alabama was reported to have 195,000 confirmed cases and 2973 deaths.¹⁰ As the number of COVID-19 cases in Alabama is expected to increase as the infection rate rises, the study expects to see exceptionally greater burdens on the state's hospital infrastructure. Further, the study expects to see numerous negative outcomes such as greater emotional and mental workload for

healthcare professionals working during COVID-19.^{14,16,22,24} To better understand these negative externalities, additional research is required that investigates the severity of the social, emotional, and mental impact of working as a nurse during the COVID-19 pandemic.

While studies have investigated nurse stress during both the current pandemic^{14,19,20,22,24} as well as previous outbreaks,^{16,44} there are still gaps in the discussion regarding how nurse staff perceives the efficacy of psychological intervention as a coping strategy. For example, Cai et al. (2020) in studying nurse stress during the COVID-19 pandemic note the importance of psychosocial resources such as therapy provided by in-house psychologists.¹⁴ Overall, the study suggests the importance of connecting hospital resources to nurse stress, even during a pandemic. However, such studies largely assume the prevalence of organizational support such as psychosocial resources, with other studies observing that nurse staff may not even perceive the resource as beneficial to them, opting out of using it altogether.⁴⁵

Research is also required to understand the extent to which individual characteristics such as age, seniority, being married, or having children affects perceived stress levels for nurse staff working during the COVID-19 pandemic. In more recent work, Babore et al. (2020), as well as Labrague & de los Santos (2020), found that working with patients infected with COVID-19 increased stress levels investigated nurse stress during COVID-19.^{22,24} Interestingly, the studies found that individual characteristics were not significant in explaining variations in stress levels. These findings run counter to many observations which suggest that being young, single, and less experienced is associated with greater stress levels among nurse staff.^{20,46} As a result, further testing is required to further examine the psychological impact and coping strategies of nurses while working under the COVID-19 pandemic.

Objectives

The study aims at capturing nurse staff's perceived stressors to determine what factors contribute to the highest levels of stress along demographic dimensions, as well as which coping strategies provide the most consistent form of stress reduction for nurses during a pandemic in the state of Alabama, United States.

Materials and Methods

A cross-sectional survey study was conducted in the state of Alabama. The study was approved by Auburn

University's Institutional Review Board (IRB reference # is: 20–238 EX 2005). All participants provided informed consent to participate, and that this study was conducted in accordance with the Declaration of Helsinki. Participants were notified about the aims of the project and the risks that might be associated with the survey study on the first page of the survey. Additionally, participants were notified that no identifiable information will be collected, their participation is voluntary and by completing the survey, they are agreeing to participate in the study. Informed consent was provided at the beginning of each survey, and participants were compensated for their time if they choose to continue and take the survey (\$20).

Nursing staff who are working during the pandemic in hospital settings were invited to participate in a survey that was shared and verified using LinkedIn.²² The PI and CO-PIs shared the Qualtrics link on their LinkedIn with a short introduction about the survey. A total of 126 participants responded to the survey between May 19th and June 6th of 2020. Twelve participants did not complete the survey, and five participants were verified by Qualtrics as out of the state nurses. The data for 109 surveys were analyzed.

Questionnaire Development

Principal items were drawn based on the questionnaire designed by Lee et al (2005) that was used to identify the sources of stress and coping strategies during the 2003 SARS epidemic and used again by Cai et al (2020) to evaluate similar factors and mental health outcomes among nurses in Hubei, China during the COVID-19 pandemic, and other existing instruments in the literature.^{14,16,20,21,44,47} A preliminary list of potential nurse stressors and coping strategies was created and distributed to the first group of experts (2 ICU nurses, one general nurse, one clinical nursing faculty, and one public health expert). An online focus group session was conducted with the authors and the first group to discuss the preliminary list of items. As a result of the experts' comments, five items were added, three were removed, and the wording of fifteen items were revised. A second item list was prepared and distributed to the second group of experts [one nursing faculty, three nurses (1 ICU, 1 General nurse, 1 ER), and one nursing manager], and they were requested to vote individually on keeping or discarding each item. A focus group session was then conducted with both groups and the authors to solve the disagreements.

The survey instrument consisted of four components: a demographic and work-related data component (nine items), a stressor-scale component [comprised of five constructs: Stress from taking care of patients (three items), Stress from assignments and workload (six items), Stress from personal life, friends, and colleagues (five items), Stress from a lack of knowledge about Covid-19 (nine items), Stress from the environment (six items)], nurses feelings component (open-ended question), and coping strategies component [comprised of three constructs: Avoidance (four items), Problem-solving (four items), Transference (four items), and one open-ended question to investigate other coping strategies]. The stressor items were measured with a 5-point Likert scale ranging from 1 (not at all) to 5 (very much). Stress coping strategies were investigated by counting the number of coping strategies employed by nurses that were grouped into Avoidance, Problem-solving, and Transference, respectively. Participants were asked to mark all the coping strategies they employed and the score of each category was calculated based on the count of recorded strategies (e.g. the category was given a score of 1 if the participant is not employing any coping strategy within this category. If the participant is employing the 4 coping strategies, the category was given a score of 5).

Measures Tested

Stressors

Stress with Working with Patients Infected with COVID-19 (D1)

The questions corresponding with this variable, (reported as Domain 1 or "D1") are used to measure to what degree nurses experienced stress in working with patients infected with COVID-19.^{9,14,26,46,48}

Stress Caused by Additional Workload and Assignment (D2)

Due to the increased workload caused by providing emotional and medical care for highly infectious patients, the study expects to see nurses reporting additional stress as they receive more COVID-19 cases. The questions corresponding with this variable (D2) are used to measure to what degree workload associated with COVID-19 contributed to nursing stress.^{14,16}

Stressed Caused by Personal Life, Friends, and Colleagues (D3)

Many frontline nurses are likely scared of getting their friends and family infected.^{14,16} The questions corresponding with this factor (D3) are used to measure to what degree these fears and concerns contributed to nurses' stress.

Stress Due to Lack of Knowledge About the COVID-19 (D4)

Information regarding the transmission, impacted demographics, and severity of COVID-19 is either highly limited or has changed greatly since initial reporting in March.^{2,10} As a result, the study expects to see nurses reporting increased levels of stress caused by the uncertainty of changing policies related to COVID-19.^{14,16} The questions corresponding with this factor (D4) are used to measure to what degree the uncertainty caused by a lack of reliable information contributed to nurse stress.

Stress from the Environment (D5)

The initial studies suggest that constant screening, shortage in PPE and ventilators, and shortage of staff contributed to a higher stress level among nurses.^{14,22,24} The questions corresponding with this factor (D5) are used to measure to what degree nurses perceived their environment as a source of stress.

Coping Strategies

Avoidance (CD1)

Avoidance in this study refers to actions taken by nurses to avoid physical exposure to any stimuli related to the pandemic.^{14,18,22,38,49–51} The study will use the Avoidance variable (identified as coping domain 1 or "CD1") to measure to what degree nurses relied on avoidance as a coping strategy.

Problem-Solving (CD2)

Problem-solving in this study (CD2) refers to all professional steps nurses take to reduce their stress by reducing their risk of infection.^{14,18,22,38,49–51} The study will be using the problem-solving variable to measure to what degree nurses relied on problem-solving as a coping mechanism.

Transference (CD3)

Transference here is defined as the redirection of feelings and thoughts about one person onto another person. Transference is broken into four lists of items that ask respondents on their preferred choice of transference such as religions, friends, and professional help such as

psychiatric.^{14,49,50} While transference has been used to consider "passive" occurrences such as differences of perspectives due to switching languages among bilingual people.⁵² In this case, we operationalize transference from the perspective of nurse staff wanting to transfer their negative feelings about their role as frontline health-care workers to professionals in psychological programs, caring members of religious organizations, or concerned family members.^{14,49,50} We find this measure to not only help capture the role of social distancing due to the pandemic in limiting interpersonal communication, but it also provides insights into the preferences of nurses as to whom they want to transfer their negative feelings, (or even whether they want to transfer them at all). The study will be using the transference variable (CD3) to measure to what degree nurses relied on transference as a coping strategy.

Reliability and Validity

Reliability was tested by the means of internal consistency, which reflects the inter-relatedness among the items in each construct Cronbach's alpha, with a value > 0.70 being considered acceptable.⁵³ The pilot survey was distributed to 10 nurses in Auburn, AL, and Cronbach's alpha ranged from 0.74–0.89. Test-retest stability overtime was not tested. Content validity was assessed based on the feedback and input from the two groups in the instrument design stage.

Statistical Analysis

Data from completed questionnaires were processed and analyzed using Minitab 19. Descriptive statistics such as mean value, standard deviation, frequency, and mean stress constructs were used to describe participant characteristics and domains. Multiple linear regression analysis was used to examine the relationship between the demographic information and the stressors domains as the study determined the data was normally distributed. Chi-squared χ^2 test was used to compare the responses to coping strategies employed by the nursing staff between different demographic groups.

Results

The demographic and work-related information for 109 surveys were analyzed. Table 1 shows that 89% (n = 97) of the participants were female. The participants were relatively young, with 40% (n= 44) under 30 years old. The diversity of the participants was relatively narrow,

Table 1 Characteristics of the Study Participants/Demographic Information

| Demographic Information | N | Std. Deviation | Frequency % |
|--|-----|----------------|-------------|
| Age | 109 | 1.214 | |
| <30 | 44 | | 40.45 |
| 31–40 | 22 | | 20.2 |
| 41–50 | 17 | | 15.6 |
| >50 | 26 | | 23.9 |
| Gender | 109 | 1.89 | |
| Female | 97 | | 89 |
| Male | 12 | | 11 |
| Ethnicity | 109 | 1.1 | |
| White | 98 | | 89.9 |
| African American | 11 | | 10.1 |
| Others | | | |
| Marital status | | 2.87 | |
| Married | 53 | | 48.6 |
| Divorced | 10 | | 9.2 |
| Never married | 46 | | 42.2 |
| Parent status | 109 | 1.35 | |
| No | 71 | | 65.1 |
| Yes | 38 | | 34.9 |
| Seniority | 109 | 1.6 | |
| Primary | 53 | | 48.6 |
| Intermediate | 47 | | 43.1 |
| Senior | 9 | | 8.3 |
| Specialty | 109 | 3.48 | |
| General nurse | 33 | | 30.3 |
| ICU | 31 | | 28.4 |
| OR | 19 | | 17.4 |
| ER | 12 | | 11 |
| Other | 14 | | 12.8 |
| Shift | 109 | 1.33 | 100 |
| Morning | 73 | | 66.4 |
| Night | 36 | | 32.7 |
| Number of hospitalized COVID-19 patients | | | |
| 1=<100 | 21 | 0.957 | 19.3 |
| 2=101–250 | 34 | | 31.2 |
| 3=251–400 | 39 | | 35.8 |
| 4≤ 401 | 15 | | 13.8 |

with the majority of the participants identifying as White Americans (90%) (n = 98). Relationship status was relatively even at around 50% (n = 54) of the participants reporting they were married. Only 35% (n= 38) of nurses reported having children. The majority of respondents had

limited work experience, with only approximately 9% (n= 10) of the participants reported having a senior-level position. Additionally, 28% (n= 31) were ICU nurses. Most of the participants worked during the morning shift (66.4%) (n= 72) and around 14% (n= 15) worked in hospitals that had hospitalization of more than 350 COVID-19 patients.

Stressor Domains

Stress from Taking Care of Patients (D1)

The results from the multiple regression show that the number of patients with COVID admitted to the hospital has a significant correlation with D1 (p= 0.004). In addition, parental status (p= 0.004), seniority (p= 0.007), and specialty (p= 0.000) were all found to have a significant effect on the level of D1. In addition, 68.6% (n= 74) of nurses reported concerns about their patients' condition getting worse, and 63% (n= 69) were worried about communication with patients and their families. On the domain level, around 72% (n= 79) of the younger nurses reported higher stress resulting from the condition of their COVID-19 patients getting worse. A significant difference was also found in parental status where single nurses and nurses without children reported having higher stress levels. Senior nurses reported lower stress levels, ICU and ER nurses reported higher stress levels.

Stress from Assignments and Workload (D2)

The results show that 70% (n= 76) of nurses are concerned about getting more infected patients and 70.5% (n= 77) are concerned about having to wear face masks for a long number of hours. On the domain level, statistically significant differences were found in relationship status (p= 0.000) where single nurses reported more stress, and seniority (p= 0.000) were senior nurses reporting less stress.

Stress from Personal Life, Friends, and Colleagues (D3)

The results show that around 74% (n= 81) of nursing staff are worried about getting infected, and 70% are worried about colleagues getting infected. Further, 82% (n= 89) of nurses are worried that their families will get infected, with 65% (n= 71) reported being concerned about being avoided by their friends and family members. On the domain level, statistically significant differences were found in the number of admitted patients with COVID-19 (p = 0.000) which was linked to a higher stress level, relationship status (p = 0.001) with single nurses reporting

more stress, seniority ($p = 0.002$) with senior nurses reporting less stress, and specialty ($p = 0.003$) with ICU nurses reporting more stress.

Stress from a Lack of Knowledge About Covid-19 (D4)

Results from the descriptive analysis show that 77% ($n = 84$) of participants were concerned with the lack of specific treatment for COVID-19, with 76% ($n = 83$) of nurses concerned with a lack of psychological support for patients. Additionally, more than 76% ($n = 83$) of nurses were concerned with constant changes to regulations related to COVID-19, with 63% ($n = 69$) concerned about the stay at home order being lifted too early and around 79% ($n = 86$) were concerned about how long the pandemic will last. Further, 65% ($n = 71$) were stressed about hearing the news/reports for the number of new cases every day, and 62% ($n = 68$) was stressed about being constantly screened for infection.

On the domain level, the number of patients with COVID admitted to the hospital was statistically significant and linked to a higher level of stress ($p = 0.039$). Gender was also found to be statistically significant ($p = 0.000$) with female participants reporting more stress. Both relationship status ($p = 0.018$) and parental status ($p = 0.009$) were found to be statistically significant, with single participants and participants without children reporting less stress. Nurse specialty was also found to be statistically significant, ($p = 0.000$) with participants working in operating rooms, pediatric units, and maternity units reporting less concern and number of patients.

Stress from the Environment (D5)

The results show that around 65% ($n = 71$) of nurses were concerned about the lack of psychological support from their healthcare organization. Around 77% ($n = 84$) of nurses reported stress when they hear news related to hospital staff shortages, around 79% ($n = 86$) are worried about PPE shortages, and 69% ($n = 75$) were worried about ventilator shortages and 79% ($n = 86$) are concerned about face masks shortage. On the domain level, statistically significant differences were found in gender ($p = 0.000$), with female nurses reporting higher stress. Relationship status ($p = 0.006$) was found to be statistically significant, with single participants reporting higher stressors. Seniority was found to be statistically significant ($p < 0.003$) with senior-level nurses reporting less stress. Lastly, specialty ($p = 0.00$) was found to be statistically significant with ICU nurses reporting higher stress.

Nurses Feelings During the Pandemic (Open-Ended Question)

Nurses responded to the open-ended question; the words they used are summarized in Table 2. Fatigue was found to be the most prevalent word (95 times) used to summarize hospital nurses' feelings about their experience in working due to the COVID-19 pandemic, with anxiety (76) and burnout tied for 2nd place. Other high scoring emotions (used more than 60 times) included stress, sadness, and frustration in descending order. While fatigue is highly common and expected for nurses engaging in infectious patients, the high use of particularly impactful words such as anxiety, burnout, and depression leave the investigators wondering why nurses are not using or reporting the use of psychological therapy.

Coping Strategies Avoidance (CDI)

The results show that around 36% ($n = 39$) express that they are avoiding working overtime to reduce exposure to COVID-19 patients. Around 10% ($n = 11$) of nurses reported avoiding work with COVID-19 patients, 50.4% ($n = 55$) reported avoiding media news about COVID-19 and related

Table 2 Nurses Response to Open-Ended Questions

| Words Used | Number of Times Mentioned | % |
|--|---------------------------|----------|
| Sadness | 68 | 62.38532 |
| Stress | 71 | 65.13761 |
| Anxiety | 76 | 69.72477 |
| Fatigue | 95 | 87.15596 |
| Burned out | 76 | 69.72477 |
| Fear | 35 | 32.11009 |
| Depression | 64 | 58.7156 |
| Emotional | 47 | 43.11927 |
| Exhaustion | 43 | 39.44954 |
| Discomfort | 26 | 23.85321 |
| Frustration | 73 | 66.97248 |
| Upset/depressed/Anger toward unsupportive management | 8 | 7.33945 |
| Do not feel seeing people or friends | 5 | 4.587156 |
| Guilt | 4 | 3.669725 |

information such as infection and mortality rates. Around 6% ($n=7$) of nurses reported avoiding seeing people in general. On the domain level, there were statistically significant differences in the Avoidance domain among age ($\chi^2 = 24.8$, $p < 0.001$, $df = 3$) and specialty ($\chi^2 = 20.57$, $p < 0.001$, $df = 4$), with younger nurses and OR, pediatric, and maternity nurses reporting more use of avoidance strategies.

Problem-Solving (CD2)

The results show that around 75% ($n=82$) of nurses are following strict protective measures (handwashing, face masks, protective gear, etc.), with 37% ($n=40$) reported learning about COVID-19, its prevention, and mechanism of transmission. Around 57% ($n=62.13$) reported practicing social distancing to reduce infection, with 51% ($n=56$) reportedly taking necessary precautions when grocery shopping. On the domain-level, there were statistically significant differences in the problem-solving domain among gender ($\chi^2 = 21.252$, $p < 0.001$, $df = 1$) with male nurses reporting less use of problem-solving strategies. Further, relationship status ($\chi^2 = 6.5$, $p < 0.05$, $df = 2$) and parental status ($\chi^2 = 7.184$, $p = 0.007$, $df = 1$) were found to be statistically significant, with single participants and participants without children reporting the higher levels. Lastly, specialty ($\chi^2 = 9.912$, $p < 0.05$, $df = 4$) was found to be statistically significant, with general nurses and ICU nurses reporting higher use.

Transference (CD3)

The results found that 41.2% ($n=45$) of nurses are practicing religious or spiritual activities such as prayer, meditation, and reading. Around 73% ($n=80$) of nurses are practicing relaxation activities in their free time, such as watching movies, reading, exercising, etc. Further, around 73% ($n=80$) reported chatting with family and friends to relieve stress and obtain support. The results found that no nurses reported ever seeking help from a psychologist as a coping strategy. On the domain level, there were statistically significant differences in the number of hospitalized COVID-19 patients ($\chi^2 = 12.920$, $p \leq 0.005$, $df = 3$), where nurses working in hospitals with fewer admitted patients reported the highest score for using transference.

Other Coping Strategies (CD4)

The results show that over 10% of nurses were engaged in coping strategies not listed above. Seven nurses (6.3%) reported spending time with their children as a coping strategy during the pandemic, with 4.6% reporting engaging in general activities with their children, and 1.8% reporting the use of arts and crafts with their children.

Further, 6 nurses (5.5%) reported drinking alcohol as a coping strategy. None of these coping strategies were found to be statistically significant.

Discussion

This study finds that nurses are experiencing additional emotional and mental stress during the current outbreak. The study shows that nurses exhibited workload-related stress resulting from taking care of infected patients and stress resulting from receiving more patients, with 71% of nurses are concerned about receiving more COVID-19 cases. These findings are inconsistent with Cai et al. (2020), whose findings suggest that nurse commitment and a sense of responsibility in ensuring healthcare delivery suppressed fears and anxiety in working with patients with COVID-19.¹⁴ However, Lee (2005) studying previous pandemics such as the 2004 H1N1 influenza pandemic found similar results, citing factors such as stress, fatigue, and burnout as nurses have to spend several days in a row looking after highly infectious patients.¹⁶ This study also found that most hospital nurses (82%) were stressed about getting their friends and family infected. This is consistent with both Lee et al. (2005) and Cai et al. (2020), who found that nurses are afraid of spreading their heightened risk of infection to their loved ones.^{14,16}

This study's findings suggest that professional experience may play a significant role in the way nurses perceive stress during a pandemic. On one hand, a relatively new nurse may perceive stressors as more emotionally or mentally impactful due to a lack of experience in dealing with various levels of patient acuity, resource capacity, or supervision. On the other hand, a senior nurse may have developed greater emotional and mental resilience out of job necessity, suggesting that nurses learn how to process certain stressors as less impactful over time. These findings support evidence regarding the relationship between seniority and age on job stress in health-care systems.^{20,21,46,51}

Differences in Stress Levels and Stress-Related Outcomes on Demographic Levels

While differences along experience levels can explain trends related to differences in stress within various age groups, others such as nurse concerns with hospital administrative outcomes (eg the amount of PPE, the prevalence of staff shortages), and the number of COVID-19 cases lend to other explanations. Even though younger, less

experienced nurses reported higher stress as a result of COVID-19, more than 52% (n= 57) of respondents considered quitting their job as a result of the COVID-19 pandemic. Further, because most respondents were over the age of 40, the study finds that nurses are likely experiencing stress beyond the level that additional experience can overcome. This study's findings provide insights that scholars suggested were absent from this pandemic, as certain works found no differences in anxiety and stress levels due to individual characteristics.²⁴ For example, it was found that 68.6% (n= 74) of nurses reported concerns about their patients' condition getting worse, with 72% (n= 79) of the younger nurses reporting higher stress overall. These findings highly suggest that job stressors such as patient acuity as well as individual characteristics such as age play crucial roles in the way frontline nurse staff perceive stress levels. Further, 63% (n= 69) were worried about communication with patients and their families. Individual characteristics may provide a moderating effect on the stress levels of nurse staff engaging with highly infectious patients with rapidly deteriorating health in many cases.³⁰ Further, age may also contribute to anxiety and stress levels perceived by nurse staff in completing tasks requiring high amounts of emotional fortitude such as screening phone calls from the anxious family members of patients infected with COVID-19.³⁰ This study's findings provide further evidence that such job demand stressors related to frontline nurse staff may be tied to the ethical challenges found in taking care of infectious patients while also taking care of yourself or loved ones.^{31,32} Additionally, this study's findings provide contextual support for the moral injury and trauma sustained by frontline nurse staff who choose to continue treating patients infected with COVID-19 despite their feelings of fear and burnout.³² Further research is needed to explore the motivations of frontline nurse staff, and their capacity to influence salient human resource variables.^{54,55}

Differences in Risk Perception

This study's findings suggest that there is a difference in the perspective of nurses as professionals versus nurses as parents. Related studies have found similar insights that can be found from studies observing the health decisions of healthcare workers during previous pandemics. For example, one survey study capturing the perspectives of healthcare workers with children during the 2009 H1N1 influenza pandemic found that HCW uses the rationale of a patient rather than that of a professional to make their

health decisions, regarding preventative measures for the pandemic.⁴¹ These findings suggest that nurses may perceive the efficacy of healthcare treatments and procedures differently when making health decisions for themselves and as a parent. Further, given the timing and availability of risk information, the study also supports the idea that HCWs are subject to the same or similar biases related to health information outside of their expertise. In the case of COVID-19, this study finds that many nurses in Alabama are likely making decisions for themselves and their children based on information provided by media coverage of COVID-19, which has emphasized the disease's impact on aging patients. This study's findings support literature suggesting that hospital nurse parents think like average civilians rather than professional health care workers outside of work.⁴¹ Further, the findings support studies suggesting that HCWs with lower health literacy may fail to perceive the efficacy of healthcare delivery.^{41,56–58}

Differences in Coping Strategies

It was suggested by literature that avoidance strategies are an attempt to avoid unnecessary interactions or new COVID-19 information might be a way for nurses to escape from stressors caused by overly engaging.^{49,50} These nurses may seek to only engage with patients and the relevant information in so far as to ensure professional accountability. This study found that many participants (50%, n = 54) reported avoiding media coverage providing updates on COVID-19 infection and mortality statistics. While the media coverage may not provide a direct benefit to hospital nurses, updated reports on infection and mortality rates are often accompanied by reports of additional infection sites designated "hot spot" zones. Studies on pandemic health outcomes and risk communication found the prevalence of media in the dissemination of information related as significant in understanding the health and safety habits of HCW during previous pandemics such as the 2009 H1N1 influenza.⁴¹ Following this logic, this study's findings may suggest that a reliance on the avoidance strategy for nurses could significantly limit their access to updated risk information which may include improved studies or additional protective measures.

Additionally, this study finds that protective measures are not readily used by all nurses as coping strategies, with only 75% (n= 82) of nurses reporting that they follow strict protective measures such as hand-washing, face masks, protective gear, etc. to reduce their risk of infection. Despite all nurses knowing to help prevent the spread

of COVID-19, up to 25% (n= 27) failed to perceive protective measures as their most effective strategy to reduce their risk of COVID-19, their risk of getting others infected, and the overall burden to their hospital's capacity. The difference among certain groups of nurses in adopting protective measures may be indicative of differences in their perception of the severity and characteristics of COVID-19 based on the limited information provided by media. This study's findings are ultimately consistent with Babore (2020) and other works finding problem-solving as the dominant and most significant coping strategy in reducing frontline nurse staff stress.^{14,18,22,49,51}

Differences in Findings: A Lack of Organizational Support

Cai et al. (2020) and Lee et al. (2005) found that nurses' experiences during the COVID-19 and 2003 SARS pandemic had both positive and negative psychological impacts on nurses.^{14,16} For example, while many felt nervous and worried, the study found that many nurses reported feeling their service was an "act of duty".¹⁶ The authors suggest that while worrying about infecting their families and colleagues, nurses were able to cope with the situation through various means. It was found that the importance of hospital administration provided psychological support as a crucial factor in the nurse's ability to overcome their challenges.^{14-16,20,23} Lee et al. (2005) report that a psychiatric team including two senior psychiatrists and two psychologists provided various psychiatric services including psychoeducation debriefing groups, a counseling hotline, and individual psychotherapy.¹⁶ Further, Cai et al. (2020) cite current psychological assistance services provided in China and recommends further assistance to support the psychological and emotional burdens of nursing. The study recommends a tailored approach similar to Cai et al. (2020), whereby frontline nurse staff are encouraged to speak with a loved one through video chat or receive individual psychotherapy at least once during their shift.¹⁴ Literature suggests that due to the fear of getting their families infected, nurse staff may not be spending as much time engaging with friends and family.^{14,24} This creates a gap in social support that can be addressed through compassionate management policies.

Limitations

While this study found that frontline nurse staff experience heightened stress from the pandemic, the current design is limited in its capacity to make causal inferences outside of

associations and trends within hypothesized relationships between job demands and individual characteristics and nurse staff stress. Additionally, the nurses sampled largely came from the two dominant nonprofit hospitals in the state.^{13,43} However, the insights should not be understated, as the results reflect regional variations within the state of Alabama, and as a result, provide insights into variations of nurse staff stress that would otherwise be more difficult to capture with aggregate data from the general population.

Conclusion

The study shows that the COVID-19 pandemic causes an increase in the stress level for nurses in Alabama, with nurses exhibiting workload-related stress resulting from taking care of infected patients and stress resulting from receiving more patients. Further, the study finds the concerns raised in the survey by nurses related to hospital resources and the lack of reported usage regarding psychological therapy as a transference coping strategy lend some evidence of organizational gaps whereby access to the service might be limited (or non-existent). This study's findings ultimately support literature raising awareness of the importance of health literacy in risk communication,^{41,56-58} as well as literature seeking to further understand the sources of stress among frontline nurse staff.^{14,16,19,20,22-24,51}

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The authors have no conflicts of interest to disclose.

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