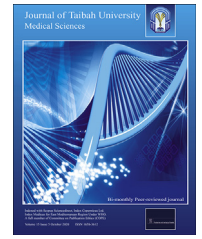




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Original Article

## Measuring the extent of stress and fear among Registered Nurses in KSA during the COVID-19 Outbreak

Nahla A. Tayyib, Ph.D\* and Fatma J. Alsolami, Ph.D

Faculty of Nursing, Umm Al-Qura University, Makkah, KSA

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### المخلص

**أهداف البحث:** تهدف الدراسة لتقييم الآثار النفسية التي تتمثل في مستوى الخوف والتوتر لدى الممرضين والمرمضات أثناء جائحة كورونا في المملكة العربية السعودية. وتهدف الدراسة أيضا إلى دراسة العوامل المرتبطة التي تساعد من زيادة أو نقص الآثار النفسية على الممرضين أثناء الجائحة.

**طرق البحث:** تم إجراء دراسة مستعرضة لجميع الممرضين والمرمضات في المملكة العربية السعودية العاملين مع مرضى جائحة كورونا. عن طريق استبانة مصدقة ذاتية الاستخدام، تضمنت أسئلة حول التفاصيل الاجتماعية والديموغرافية والضغط الوظيفي المرتبط بجائحة كورونا، والخوف من الإصابة منها. تم تحليل البيانات باستخدام إحصاءات الارتباط الوصفي وتحليل الانحدار المتعدد.

**النتائج:** تم تحليل 314 استبانته ذاتية. وأظهرت النتائج أن الممرضين والمرمضات يعانون من القلق والخوف والتوتر الشديد أثناء تفشي الجائحة. الممرضون كانوا أكثر خوفا بشأن سلامتهم وسلامة أسرهم، ومع ذلك هم أيضا أكثر مسؤولية عن توفير الرعاية للمرضى المصابين. علاوة على ذلك، يشير التحليل إلى بعض العوامل المرتبطة التي زادت من مستوى الخوف لديهم بما في ذلك: وسائل التواصل الاجتماعي، والتعرض لإصابات قبل تفشي المرض، الجاهزية لرعاية المرضى المصابين.

**الاستنتاجات:** أبرزت هذه الدراسة أن الممرضين والمرمضات يتعرضون لمستويات عالية من التوتر والخوف أثناء رعاية المرضى الذين يعانون من جائحة كورونا ويجب مراعاتهم. علاوة على ذلك، كان هناك بعض العوامل التي يجب مراعاتها، ولها تأثير كبير على الحالة النفسية لديهم، وقد تؤثر على جودة الرعاية المقدمة وسلامة الممارسة.

**الكلمات المفتاحية:** الممارسة السريرية؛ جائحة كورونا؛ الآثار النفسية؛ سلامة المرضى؛ الممرضون؛ الممرضات؛ المملكة العربية السعودية

\* Corresponding address: Faculty of Nursing, Umm Al-Qura University, P.O Box 715, Makkah, KSA.

E-mail: natayyib@uqu.edu.sa (N.A. Tayyib)

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### Abstract

**Objectives:** The novel Coronavirus Disease 2019 (COVID-19), also known as severe acute respiratory syndrome coronavirus, was officially recognised in the KSA in March 2020. Registered nurses (RNs) play a frontline role in the delivery of healthcare services to the COVID-19 patients. This role has potentially exposed RNs to infection with its associated consequences. We conducted this study to assess the psychological effects of fear and stress, and level of resilience to the COVID-19 outbreak by RNs in KSA.

**Methods:** In this cross-sectional study, we recruited all RNs working with patients with the COVID-19 in KSA during the outbreak. All participants completed an anonymous questionnaire, which included items about their sociodemographic details, job stress related to the COVID-19, and fear of infection. Data were analysed with descriptive correlation statistics and multiple regression tests.

**Results:** In total, 314 RNs responded to our survey. The results showed that the RNs had high levels of anxiety and stress during the COVID-19 outbreak. RNs were fearful about their safety and the well-being of their families. However, RNs felt more responsible for providing care to the COVID-19 patients. Moreover, our results signalled some predictive factors that increased RNs' level of fear, such as social media ( $\beta = 0.76$ ,  $p = 0.03$ ), exposure to trauma prior to the outbreak ( $\beta = -0.95$ ,  $p = 0.003$ ), and readiness to care for infected patients ( $\beta = -0.21$ ,  $p = 0.001$ ).

**Conclusion:** This study reports high levels of perceived stress and fear among RNs in KSA while caring for patients with the COVID-19. Furthermore, certain factors

have a significant impact on RNs' psychological status, which may affect the quality of patient care and safety.

**Keywords:** Clinical practice; COVID-19; Registered nurses in KSA; Physiological impact; Patient safety

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## Introduction

The COVID-19 is highly contagious and infects the respiratory system, causing severe acute pneumonia, high fever, fatigue, and dyspnoea. The first COVID-19 case was discovered in Hubei Province in south China.<sup>1</sup> The disease is marked with rapid transmission. By the end of July 2020, the number of infected cases was 16 million cases globally. The World Health Organisation declared it a pandemic because of its rapid transmission and projected its significant influence on global healthcare systems. In KSA, the first case of the COVID-19 was reported on 2 March 2020. Consequently, the country announced an emergency response plan to control the wide spread of the outbreak. However, despite the intensive measures taken in KSA, thousands of infected cases with 615 recoveries and 41 deaths were reported within 2 months.<sup>2</sup> The disease is not restricted to specific people. As such, the outbreak will drastically alter normal life and psychological resilience.

Many healthcare workers including nurses are on the frontline of caring for infected cases during infectious outbreaks worldwide. They are the most vulnerable to and at high risk of infections.<sup>1,3</sup> The rates of occupationally acquired Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS-CoV) infections during these outbreaks among healthcare workers was 21% and 18.6%, respectively.<sup>3</sup> This phenomenon has led to increased work-related stress, which is usually high among nurses because of their frequent exposure to unfamiliar contagious diseases. These aspects greatly influence nurses' psychological health. Investigating the psychological consequences of the outbreaks of acute respiratory infectious diseases on nurses, numerous studies demonstrated the significant associations of outbreaks with mental health problems<sup>4</sup>; increased stress<sup>5</sup>; refusal to care for patients<sup>6</sup>; desire to leave the job<sup>7</sup>; and psychological problems such as anxiety, depression, and hostility.<sup>8</sup> Furthermore, 27% of healthcare workers experienced psychiatric symptoms,<sup>9</sup> and fear and nervousness,<sup>7,10</sup> stigma,<sup>11</sup> and posttraumatic stress<sup>9</sup> were also observed.

The psychological effects of these outbreaks on healthcare workers should be urgently assessed, understood, and monitored. Understanding and assessing these effects are essential to the promotion and protection of healthcare workers' well-being and emotional resilience, which directly affect the quality of healthcare services amid an outbreak such as the COVID-19. In KSA, few studies have focused on assessing the psychological effect of respiratory disease

outbreaks on nurses.<sup>12–14</sup> The current study was conducted on a nationwide level to assess the psychological effect of the recent COVID-19 outbreak in KSA on nurses and provide accurate figures of the extent of this phenomenon.

## Objectives

One aim of this study was to assess the psychological effects, represented by fear and stress level, of the COVID-19 outbreak on nurses in KSA. The other aim was to identify significant factors correlated with RNs' perceived level of fear and stress.

## Materials and Methods

### Study design

A descriptive, cross-sectional design was used to guide the process of data collection and analysis.

### Setting and participants

Data were collected through convenience sampling from 25 March to 6 April 2020 at the height of the COVID-19 outbreak in KSA. All nurses working in tertiary hospitals during the outbreak were invited to answer the survey questions. The inclusion criteria included all registered nurses (RNs) working in hospital settings, nurses who understand the English language, and those willing to participate in the study. The sample size was calculated based on the 1:10 rule, which is essential to ensure the statistical power of the analysis. Therefore, 260 participants were needed based on the 28 variables included in this study.<sup>15</sup> However, a study stated that a large sample size of 300 or more participants is crucial in a clinical survey conducted in a non-experimental study.<sup>16</sup> Thus, the minimum sample size required to ensure the strong statistical power of the analysis was 300.

Ethical approval was obtained from the Nursing Research Ethical Committee at the Vice Deanship of Research and Postgraduate Studies in the Faculty of Nursing, Umm Al-Qura University (UQU). The researchers of this study adhered to the ethical standards on conducting studies involving human participants as stated in the 'Declaration of Helsinki' report.<sup>17</sup> This study was announced to nursing leaders affiliated with the Ministry of Health Regional Offices in KSA through an official email from the Vice Deanship of Research and Postgraduate Studies in the Faculty of Nursing, UQU. They were willing to share the survey with different hospitals and medical centres in their region. A description of the study background, importance, objectives, and aim was included at the beginning of the online survey. Participants were informed on the first page of the survey that participating in this study is voluntary and that proceeding with the online survey indicates their agreement to join the study. The online survey collected no personal information from the participants to ensure the confidentiality and anonymity of the data collected. Participants were deemed to consent to participate by submitting the survey.

### Instrument

This study involved an online survey platform (Microsoft form) on which participants completed a questionnaire comprising 36 items. The survey was divided into five sections: demographic information, exposure to the COVID-19 outbreak, job stress related to the COVID-19, fear of infection, and factors that might contribute to stress. Demographic information included age, nationality, gender, marital status, education level, employment status, type of healthcare facility, work experience in a hospital in KSA, and status of working with the COVID-19 patients. The second section included six items to assess exposure to the COVID-19 outbreak either directly such as working with cases confirmed as positive or indirectly through different types of media. The third section included ten items, from SARS-related stress, which was adopted and modified with permission from authors the (SARS-related stress) to be compatible with the study objectives.<sup>18</sup> A validation of the original SARS-related stress instrument showed internal consistency with a Cronbach's alpha of 0.71.<sup>5</sup> However, the instrument was modified for the purposes of this study so that it could be used for the COVID-19 outbreak. Each of the ten items is rated on a Likert scale ranging from 0 to 10. Nine items addressed the perception of stress related to the COVID-19 during the pandemic, and the last item measured the altruistic acceptance of risk. The fourth section included six items that aimed to assess RNs' level of fear using a five-point Likert scale ranging from 1 (not at all) to 5 (very). Five additional items were constructed based on the current literature and local context.<sup>5,7,9</sup> The validity and reliability of the study survey were evaluated. The content validity index was 0.95 and Cronbach's alpha coefficient was 0.9.

### Data analysis

Descriptive statistical methods were performed using SPSS (version 25; Chicago, IL). The level of statistical significance was set at a p-value of  $\leq 0.05$  (29). All demographic characteristics were analysed using descriptive statistics (frequencies and percentage) and a mean test was employed for RNs' perceptions of stress related to the COVID-19. Bivariate analyses were performed to identify the variables associated with RNs' level of fear and to explore the direction of the relationship between the correlated variables and their level of fear. Finally, a linear regression adjusted for covariates (age, working experiences, type of healthcare facility, prior exposure to trauma, impact of social media) was used to explore the variables that influence RNs' level of fear during the outbreak.

### Results

#### Demographic characteristics

The response rate was 87% (N = 314 out of a total of 360 questionnaires). The majority of respondents were female (80.4%) and married (70%), and 34.7% held a bachelor's degree in nursing. Approximately one-third of the participants were aged 31–36 years old. [Table 1](#) summarises the

**Table 1: Demographic characteristics of study participants (N = 314).**

Variable	n (%)
<b>Gender</b>	
Male	49 (15.6)
Female	265 (84.4)
<b>Nationality</b>	
Saudi Arabian (KSA)	245 (78)
<b>Age</b>	
Less than 25 years	2 (0.6)
25–30 years	72 (23.2)
31–36 years	113 (36)
37–40 years	78 (24.8)
41–50 years	38 (12.1)
More than 50 years	10 (3.2)
<b>Marital Status</b>	
Single	76 (24.2)
Married	222 (70.7)
Other	16 (5.1)
<b>Education</b>	
Diploma	104 (33.1)
Bachelor's degree	109 (34.7)
Bachelor's degree with SCFHS <sup>a</sup> diploma	66 <sup>21</sup>
Master's degree	31 (9.9)
Ph.D degree	4 (1.3)
<b>Work Experience</b>	
Less than 5 years	37 (11.8)
5–10 years	118 (37.6)
11–15 years	80 (25.5)
16–20 years	45 (14.3)
More than 20 years	34 (10.8)
<b>Type of Healthcare Facility</b>	
Primary care	64 (20.4)
Secondary care	5 (64.6)
Tertiary care	203 (64.6)
Surveillance Department	42 (13.4)
<b>Working Status with the COVID-19</b>	
Front-line	129 (41.1)
Second-line	185 (58.9)
Working with the COVID-19 (Yes)	98 (31.2)
Quarantining during the COVID-19 outbreak (Yes)	43 (13.7)
Relative or friends were infected by the COVID-19 (Yes)	24 (7.6)
<b>High Exposure to News on the COVID-19 Outbreak</b>	
Television (Yes)	162 (51.6)

**Table 1** (continued)

Variable	n (%)
Medical Websites (Yes)	265 (84.4)
Social media (WhatsApp, Podcast, Snapchat, Twitter) (Yes)	229 (72.9)
Have you experienced any trauma prior to the COVID-19 (Yes)	147 (46.8)

<sup>a</sup> Saudi Commission for Health Specialties.

descriptive statistics of participants' demographic characteristics.

#### *RNs' perceptions of stress related to the COVID-19 and level of fear*

The results indicated that the RNs generally had high levels of anxiety and stress during the COVID-19 outbreak (7.76 out of 10). Table 2 presents an overview of RNs' perceptions of the COVID-19-related stress they experienced during the outbreak. The participants reported that their job placed them at a high risk of being infected (mean = 7.61, SD ± 2.72) and caused them much stress at work (mean = 6.92, SD ± 2.91) and about falling ill (mean = 6.72, SD ± 2.98). Furthermore, they had a high level of fear of passing the COVID-19 to their families,

friends, and colleagues (mean = 7.61, SD ± 2.72). Nevertheless, despite their perceived increased stress during the outbreak, they still tended to altruistically accept the risks (mean = 6.92, SD ± 2.89). Furthermore, all participants reported having attended yearly infection control training and received adequate personal protective equipment (PPE). Approximately 48% of the RNs believed their hospitals had a clear plan for handling the COVID-19 outbreak. However, 60% felt they were not personally well prepared for the outbreak.

#### *Correlated variables for RNs' level of fear*

Table 3 shows that RNs' level of fear and stress of being infected with the COVID-19 was significantly associated with the infection of their relatives or friends ( $t[314] = 2.018$ ,  $p < 0.04$ ), high exposure to social media ( $t[312] = 2.436$ ,  $p = 0.015$ ), type of healthcare facility ( $F[3,310] = 5.141$ ,  $p = 0.002$ ), and psychological trauma prior to the COVID-19 outbreak ( $t[311] = 3.218$ ,  $p < 0.001$ ). A very weak relationship was found between RNs afraid of being infected with the COVID-19 and their readiness to take care of patients with the COVID-19 ( $r = -0.28$ ). Therefore, the associations between these variables should be interpreted with caution.

Whether all significant related variables predict RNs' perceived level of fear during the COVID-19 outbreak was determined through a multiple regression analysis. The model was statistically significant ( $F[5,303] = 7.44$ ,  $p < 0.001$ ,  $R^2 = 0.209$ ). Statistically significant factors that

**Table 2: Overview of RNs' perceptions on the COVID-19 stress scale and current level of fear (N = 314).**

Variable	mean (SD <sup>a</sup> )
I believed that my job was putting me at great risk.	7.61 (2.72)
I felt extra stress at work.	6.92 (2.91)
I was afraid of falling ill with the COVID-19.	7.72 (2.21)
I felt I had little control over whether I would get infected or not.	5.59 (2.99)
I thought I would be unlikely to survive if I were to get the COVID-19.	3.99 (2.91)
I thought about resigning because of the COVID-19.	2.26 (2.34)
I was afraid that I would pass the COVID-19 on to others.	7.61 (3.0)
My family and my friends were worried that they might get infected through me.	6.67 (3.25)
People avoided my family because of my work.	4.97 (3.51)
Because I wanted to help patients with the COVID-19, I was willing to accept the risks involved.	6.92 (2.89)
Thinking about the COVID-19 makes me feel anxious.	6.88 (2.83)
I feel tense when I think about the threat of the COVID-19.	6.53 (2.87)
I feel quite anxious about the COVID-19 pandemic.	7.62 (2.62)
Being infected with the COVID-19 makes me feel nervous and anxious.	7.76 (2.42)

<sup>a</sup> Standard Deviation.

**Table 3: Correlation between RNs' level of fear and stress and their demographic characteristics**

Variable	test	Significant
Relative or friends became infected with the COVID-19	2.018 <sup>b</sup>	0.04
Social media (WhatsApp, Podcast, Snapchat, Twitter) (Yes)	2.436 <sup>b</sup>	0.015
Type of healthcare facility	5.141 <sup>c</sup>	0.0002
Having any trauma prior to the COVID-19 (Yes)	3.218 <sup>b</sup>	0.001
Readiness to take care of patients with the COVID-19	-0.28 <sup>a</sup>	0.01

<sup>a</sup> Pearson Correlation test.

<sup>b</sup> t-test.

<sup>c</sup> One-way ANOVA test.

**Table 4: Multiple regression analysis for factors predicting RNs' perceived level of fear during the COVID-19 outbreak.**

Variable	B	SE	$\beta$	<i>p</i>
Relative or friends became infected with the COVID-19	-1.05	0.58	-0.098	0.07
Social media (WhatsApp, Podcast, Snapchat, Twitter) (Yes)	-0.784	0.35	-0.120	0.02
Type of healthcare facility	-0.22	0.18	-0.066	0.225
Having any trauma prior to the COVID-19 (Yes)	-0.935	0.31	-0.162	0.003
Readiness to take care of patients with the COVID-19	0.230	0.059	0.212	0.0001

increased RNs' level of fear were social media ( $\beta = 0.76$ ,  $p = 0.03$ ), exposure to trauma prior to the outbreak ( $\beta = -0.95$ ,  $p = 0.003$ ), and readiness to care for infected patients ( $\beta = -0.21$ ,  $p = 0.001$ , Table 4). However, the RNs felt confident that the hospital would take care of them if they contracted the COVID-19 ( $r = 0.31$ ,  $p < 0.001$ ).

## Discussion

The present study was the first in KSA to assess the psychological influence of the COVID-19 outbreak on nurses from the aspects of their fear and stress, and level of responses, and to identify related variables.

The findings of this study showed that RNs working during the outbreak in KSA perceived a high risk of the COVID-19. The fear of infection among RNs has been extensively reported in studies that focused on acute respiratory infection outbreaks. A study found that frontline healthcare workers who worked directly on cases of MERS-CoV perceived a high level of risk and stress related to the outbreak.<sup>7,12</sup> This result is aligned with that in a previous study conducted during the SARS outbreak in Singapore, which showed that health workers perceived the risk of infection.<sup>19</sup>

The current study showed that despite their willingness, 60% of the RNs were not personally prepared to take care of patients infected with the COVID-19. RNs perceive fear regarding contracting occupationally acquired infections while treating patients infected during an outbreak when they lack institutional support for health workers with clear policies and procedures.<sup>11</sup> Another reason is the lack of managerial support that includes providing information and monitoring nurse training, which improves the confidence of nurses involved in healthcare during outbreaks.<sup>20</sup>

Social and family support during stressful events such as pandemics help reduce the level of stress and threat perception. Unfortunately, this study showed that the RNs lacked this aspect, given that they demonstrated fear of transmitting the infection to their families, friends, or colleagues. This finding is aligned with that of other studies reporting health workers' fear of passing the infection to their family and children.<sup>1</sup> The unfamiliarity of the virus and limited information available about its treatment increase RNs' fear regarding their families. Furthermore, their experiences in providing direct care to patients with the COVID-19 also influence this fear. Providing information and frequent monitoring of nurses' performance and availability of PPE increase nurses' confidence during their work and reduce their risk of stress.<sup>21</sup> In addition, providing

extended healthcare support to the family of RNs can alleviate this fear and stress.

Interesting results were found regarding the predictors of perceived fear and stress related to the COVID-19 outbreak in KSA. RNs' fear of being infected was significantly associated with the presence of infected relatives or friends, exposure to social media, and exposure to psychological trauma prior to the outbreak.

RNs' fear of an occupationally acquired infection was linked to their previous working experience with similar situations. Previous studies conducted to explore nurses' perceived fear of being infected with HIV showed that the risk was high among those who experienced needle prick injuries.<sup>20</sup> In the absence of previous exposure, RNs perceive fear and stress from senior nurses with previous negative experiences of occupationally acquired infections who pass it to or witness the experience of an ill relative or friend.<sup>22</sup> The high media awareness of the number of cases and mortality related to the COVID-19 also plays a role in increasing perceived fear and stress, which was significant in this study. In KSA, the previous MERS-CoV pandemic in 2014 was not far.<sup>7,12</sup> RNs experienced psychological stress and fear during that time, which may explain the significant association of their prior exposure to a previous psychological trauma and perceived fear in this study.

## Implications for clinical practice

Assessing the level of fear and stress of nurses who work during outbreaks/pandemics is a priority that should be considered by nursing leaders. Furthermore, assessing the contributing factors to fear and stress related to caring for infectious cases or being exposed to information related to outbreaks is important in understanding related causes and tailoring interventions to tackle these contributing factors (e.g. coping measures, interventions to enhance emotional resilience).

## Limitations

We acknowledge limitations in the external validity of the results owing to design elements. Furthermore, the reliance on self-reports is a limitation, as these may lead to bias in reporting and overestimation of the results. Another limitation is that items in the instrument were adapted without implementing the whole process of instrument adaption and modification, for example, instrument translation. Therefore, a longitudinal study using structured clinical interviews is essential to determine the magnitude of the COVID-19 outbreak on RNs' psychological state.

## Conclusion

The findings of this study provide support to previous studies conducted in KSA during outbreaks of acute respiratory infectious diseases. RNs' high levels of stress and perceived fear of occupationally acquiring the infection while caring for patients with the COVID-19 place a risk on the quality of the care provided and safety of practice. The most important aspects that should be considered regarding RNs' perceived high levels of fear and stress are the coping measures that should be taken during and after this time to alleviate post-traumatic stress and increase their emotional resilience.

## Recommendations

Working during an infectious disease outbreak increases the stress of healthcare providers, especially RNs on the frontline taking care of infected patients. Stress and workload during an outbreak lead to the unwanted consequences of burnout. RNs working during an outbreak require close attention and an assessment of their level of fear, stress, and anxiety. Coping measures and supportive interventions are also warranted for this group of RNs.

Further longitudinal prospective studies using a large population and different time series are recommended to validate the results of this study and to provide a more thorough understanding of this issue. Moreover, it is recommended that interviews be conducted with nurses on the factors that impact their level of stress and fear during such times. These studies will facilitate the development of supportive intervention measures to improve the psychological impact on RNs during an outbreak, which will increase patient safety and ensure the high quality of care.

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## Conflict of interest

The authors have no conflict of interest to declare.

## Ethical approval

Ethical consent regarding the protocol of the study was granted by the Research Ethic Committee in Faculty of Nursing at Umm Al-Qura University.

## Authors contributions

NT and her co-author FS conceptualised and designed the study; provided research materials; collected, analysed, and interpreted data; wrote the manuscript; and critically reviewed the final draft. All authors have critically reviewed

and approved the final draft and are responsible for the content and similarity index of the manuscript.

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