Measuring and Evaluating the Work-Related Stress of Nurses in Saudi Arabia during the Covid-19 Pandemic

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Summary
Prior to the emergence of Covid-19, Saudi Arabia (SA) had never faced the challenge of dealing with a global pandemic. Significantly, the current crisis has impacted all industries and sectors in the country, including the healthcare system, and has led to an emphasis on human life being more precious and valuable than economic profit. This study focuses on the impact of Covid-19 on the health of nurses, including their quality of life, during 2020. Understanding the position of the nursing profession during the pandemic, including the most effective methods of preventing work-related stress is important. Information was acquired through an online survey method (i.e. self-completion), known as the Expanded Nursing Stress Scale (ENSS), which was distributed to nurses in all regions of SA. It was found that the main aspects impacting nurses' work-related stress include gender, employment type, training, and dealing with infected patients. In addition, they highlight that such stress plays a substantial role in patient safety and nurses' satisfaction at work, as well as the future survival of organizations. The emergence of Covid-19 as a novel infectious disease has increased nurses' uncertainty and work-related stress. The results of this research will provide insights into the views of both nurses and their managers, in order to identify the main indicators of stress.

Keywords:
Covid-19 Pandemic, Healthcare System, Nursing, Saudi Arabia, Work-Related Stress.

1. Introduction

Healthcare systems around the world are currently experiencing severe pressure, as well as considerable challenges, in the effort to deal with the unexpected crisis arising as a result of the emergence of the Covid-19 global pandemic in 2020. Like many countries, Saudi Arabia (SA) has not previously faced a similar crisis, which has impacted all industry domains and sectors, including the healthcare system. In particular, this has led to frontline healthcare workers, including nurses, encountering one of their greatest challenges in dealing with this novel and widespread respiratory disease.

In 2020, SA made a number of historical decisions to confront this crisis. From March 16th, 2020, the government suspended operations in many government agencies, resulting in considerable economic loss. However, the primary concern of Saudi leaders and governors was to maintain the health of the community and control the outbreak of the virus, emphasizing that each individual human life is more precious and valuable than economic profit. Furthermore, the principles of infection prevention and control strategies associated with healthcare were implemented for both suspected and confirmed cases of Covid-19, in order to alleviate pressure and improve the performance of Saudi healthcare workers, including nurses. This indicates a need to investigate the impact of the pandemic on the health-related quality of life of nurses during the pandemic in 2020.

2. Literature Review

Healthcare systems around the globe are made up of various types of employees, who either provide direct services to patients (i.e. nurses and physicians), or indirect services (i.e. laboratory scientists and housekeepers). The mental, physical, and social health status of these employees is central to ensure the provision of both safe and high quality services to patients (Joseph & Joseph, 2016). Due to the potential negative impact on employees' well-being and performance (Brooks et al., 2017, 2018; Lai et al., 2020), many researchers have focused on evaluating the workplace factors associated with poor mental health outcomes.

Healthcare systems and providers, including nurses, have recently faced the challenge of the outbreak of the Covid-19 pandemic, which emerged in December 2019 (Bai et al., 2020). The World Health Organization (WHO-1) (2020) considered that this would inevitably result in increased levels of stress among healthcare providers, emphasizing the need for healthcare workers (i.e. nurses) to be supported in managing their mental health, in order to provide the required levels of care. Furthermore, as health systems are heavily reliant on nurses and other healthcare providers, they need to support these employees in fulfilling their roles and remaining safe. This is particularly important as such employees will be vital in the event of any subsequent pandemic. This emphasizes the importance of the current study in examining the issues experienced by SA nurses in

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managing the stressful events related to the Covid-19 pandemic.

Stirling et al. (2017) argued that nurses tend to encounter increased uncertainty during the outbreak of infectious diseases, in particular due to the absence of sufficient data concerning the disease, such as the incubation period, duration of the infectious period, and the disease's prevalence and mortality rate (Anderson et al., 2020). This can be increased by media circulating unofficial and, at times, contradictory information, termed 'infodemic', which results in increased difficulties in finding trustworthy and reliable sources (Lazzerini & Putoto, 2020; WHO-2, 2020). Moreover, nurses require high levels of data about a disease in order to make vital decisions and enhance the awareness of patients and their families. If such information is unclear, it can result in miscommunication and mistrust in the nurse-patient relationship (Stirling et al., 2017). This was supported by Brooks et al. (2018), who concluded that a lack of clarity when it comes to instructions and precautionary measures, as well as a lack of feedback, can result in a deterioration of employees' mental health during the spread of an infectious disease.

Moreover, in the context of SA, a further issue concerns the barriers to communication between nurses and the patients. English tends to be the language employed within the Saudi healthcare system, although this is not the first language of the majority of nurses and almost all patients (Stirling et al., 2017). When patients are stressed and fearful when confronted with the diagnosis of a new and potentially deadly, disease, they seek as much information as they can from nurses (Cohen et al., 2012), with WHO-1 (2010) stating that healthcare workers need effective strategies to share such information with patients, particularly as nurses' role is to provide emotional support to those affected. This is significant, as any failure to communicate with patients and their families can lead to substandard care, patient confusion and anxiety, alongside the inappropriate utilization of medication at home (Campbell et al., 2018). Moreover, Norouzinia et al. (2016) argued that such failures can have a negative impact on nurses' satisfaction with their work. Nurses compromise the highest proportion of healthcare providers, spending the majority of their time in hospitals, healthcare centers, and clinics. In addition, the nature of the healthcare industry as a hazardous environment leads to nurses being constantly vulnerable to a variety of health and safety risks (Awan et al., 2017). During Covid-19 pandemic, WHO-2 (2020) stated that all countries must be prepared to contain the disease, which clearly increased the pressure and the workload of healthcare systems throughout the world, including SA.

Elston et al. (2017) identified that an increase in the mortality rate during the spread of Ebola virus disease in West Africa was due to overburdened healthcare facilities and the deaths of many healthcare providers. Nurses are ethically committed to care for their patients, but as noted by the American Nurses Association (ANA) (2017), they are also ethically obligated to care for themselves. This conflict of obligation is notable during a crisis, when nurses need to look after patients who may be critically ill over a long period of time. Due to the nature of their role as a caregiver, nurses are willing to respond to such situations, unless these threaten their own lives (ANA, 2017). Two studies undertaken during the spread of the Middle East Respiratory Syndrome-Related Coronavirus (MERS-Cov) in SA in 2014, found that 20% of confirmed cases consisted of healthcare providers (Memish et al., 2014; Oboho et al., 2015). A number of further studies also revealed that the mental health of nurses dealing with patients diagnosed with Severe Acute Respiratory Syndrome (SARS) and MERS-Cov tended to deteriorate (Chen et al., 2005; Khalid et al., 2016). This led to ANA emphasizing that, in order to fulfil their roles, nurses require physical, mental, and legal protection.

In addition, Stirling et al. (2017) reported that, while nurses in SA have considerable responsibilities during an epidemic (including the provision of physical and emotional care, along with patient and family advocacy), they have limited authority and their opinions are not generally heard, in response to various cultural factors, i.e. gender-roles and individualism-collectivism (Vasli & Dehghan-Nayeri, 2016). Sena (2017) noted that nurses' professional authority tends to be undermined by the dominance of physicians, some of whom demonstrate mistrust toward nurses (Alsayed & West, 2019). However, the ability to communicate in an emergency, and in response unexpected situations, is vital for the provision of patient care, particularly (as in the case of Covid-19) in the absence of any clear established procedure and the involvement of many different professionals (Stirling et al., 2017).

In addition, nurses can also experience conflicts with their nursing peers. For example, Alsayed and West (2019) found that Saudi nurses experienced discrimination, exclusion, and marginalization by non-Saudi nurses, particularly when the latter were in positions of power. This was found to be due to: firstly, a smaller number of Saudi nurses compared to those of other nationalities; secondly, expatriate nurses considering Saudi nurses to be incompetent and unable to take risks; and thirdly, Saudi nurses tending to demonstrate a low level of punctuality and a high degree of absenteeism. This results in professionals from other cultures considering Saudis incapable of occupying positions of authority, thus preventing them from demonstrating their competency and leadership abilities (Alsayed & West, 2019).

A further factor contributing to occupational stress relates to the issue of workload (Joseph & Joseph, 2016), with long working hours, shift work, and on-call duties

found to increase nursing stress, and resulting in errors (Alomari et al., 2015; Gorbach et al., 2015). During the COVID-19 pandemic, nurses have been dealing with an unprecedented, and seemingly unending, workload. WHO (2007) identified social and psychological deterioration as being linked to extreme exposure to work stressors, with a high correlation between workload, stress, and burnout (Padilha et al., 2017). Furthermore, the literature points to the relationship between workload and insufficient rest periods and the occurrence of stress and exhaustion among nursing staff (Dalri et al., 2014). WHO (n.d.) highlighted that such work-related stress can be minimized when work demands and pressures accord with health workers' knowledge and competencies.

Moreover, as discussed above, nurses caring for COVID-19 patients are exposed to a deadly infection, resulting in many experiencing various levels of psychological distress (Lai et al., 2020). In addition, the mental status of novice nursing staff can be even more seriously impacted, as they lack sufficient experience. Nursing staff in a Taiwanese study found to be physically and mentally challenged during the outbreak of SARS, as they were committed to providing a high level of nursing care to their patients (Shih et al., 2007), particularly as insufficient information and preparation can increase levels of anxiety among healthcare professionals (Alsahafi & Cheng, 2016). Moreover, it should be recognized that nurses experience grief when their patients die as a result of the virus, alongside the stress of worrying whether they may infect their own families (Chatterjee & Kagwe, 2020). The literature evidences that the mental health of healthcare providers in situations of disasters and trauma can be improved by the provision of adequate training and preparation, particularly as they are able to work in a proactive manner when confident that they know what they are facing and the action they need to take (Brooks et al., 2017, 2018). This infers that relevant training and education prior to a crisis can increase the confidence of employees (Maunder et al., 2010; Aiello et al., 2011; McEachan et al., 2016).

Furthermore, WHO-1 (2020) identified the role of leaders during the Covid-19 pandemic as being responsible for protecting their staff from work-related stress. This can include partnering newly graduated employees with senior staff, as well as familiarizing all staff members with the availability of mental health support services. In addition, Brooks et al. (2018) emphasized that it is essential to update information given to subordinates about the health event, and prepare staff for all potential ramifications. Additionally, the impact of a crisis on workers' mental and psychological health can be lessened by establishing relevant occupational policies, coping strategies, and support groups (Brooks et. al., 2018). Moreover, as fear, suspicion and distress can occur when staff lack sufficient information and support from leaders and supervisors, Alsubaie et al. (2019) concluded that health institutions need to put in place effective and clear outbreak plans, to assist their employees to cope during the spread of an infectious disease.

In addition to all the stressors discussed above, it should be acknowledged that some nurses have experienced being shunned by their family or community, due to the fear and stigma associated with Covid-19. This can have a negative impact on the mental status of the nurses, particularly due to the influence of stigma on both emotional and psychological health (WHO, 2018). It is therefore important to prevent such discrimination, in order to enhance the resilience of nursing staff during the duration of Covid-19 (Centers for Disease Control and Prevention [CDC] (2020). This is supported by research evidencing that worked-related stress can be increased by caring for infected patients, particularly due to the resulting discrimination (Cassiani-Miranda et al., 2020; Chanpa et al., 2020; Miconi et al., 2021; Trammell et al., 2021).

The Saudi Ministry of Health has made intense efforts to deal with the outbreak of Covid-19. However, this pandemic is a unique experience for many nurses in SA, particularly as many strategies drawn up to deal with similar stressful situations may not work in the current crisis (WHO-1, 2020). This indicates that it is now urgent to evaluate and document the factors promoting nurses' work-related stress associated with the emergence of this novel virus, in order to address this issue and learn lessons for any future event..

As no previous empirical work has been undertaken concerning this subject in relation to SA, this current study will address the existing gap in the literature. The study will assist in understanding the situation of the nursing profession during a national crisis and investigate the effective management of factors leading to work-related stress. In addition, the information from the targeted populated will enrich the knowledge within the field of the Saudi nursing and assist in finding solutions to problems concerning work-related stress during periods of disasters and crises. Moreover, the data analysis will result in the drawing up of evidence-based solutions.

The findings of this research will also have the potential to be utilized in the field of developing nursing management education during pandemic diseases and crises in SA**.** In addition, they will prove beneficial for teaching and training purposes, in particular for preparing Saudi nursing students. Moreover, this study can enable other countries to learn from the safety precautions and health management plans implemented in SA, including teaching the outcomes in their educational institutions. Most importantly, the objectives of this research are in line with the Saudi government's National Transformation Program 2020, which attempts to radically transform its

healthcare system, with aim of providing high-quality care and effective services**.**

3. Methods and Results

Information for this research was retrieved using an online survey method (i.e. self-completion), known as the Expanded Nursing Stress Scale (ENSS) (French et al., 2000), distributed to all nurses in every region of SA. This included both males and females of all ages, having: firstly, differing levels of work experience (including newly graduated and more experienced nurses); secondly, different levels of marital status; thirdly, a variety of specializations and qualifications; and fourthly, roles in separate departments in the workplace.

This resulted in a total of 270 responses. There were no major deviations from the histogram, however, in the scatterplot there were twenty-one extreme values, larger or lower than the majority of cases, which, after conducting the analysis of Leverage (i.e. Jackknife), could be seen to show these values as having influence points. I found twenty-one cases greater than the cut-off for the leverage method (0.0195) and the standardized residuals greater than -3. In addition, multivariate outliers were then removed from the analysis. This left 396 cases, as described in Table 1.

Table 1. Demographics of Study Sample

Demographic Variables		N	Percentage
Gender	Female	205	82.3%
	Male	44	17.7%
Marital status	Divorced	10	4%
	Engaged	6	2.4%
	Married	153	61.4%
	Single	79	31.7%
	Single mom	1	0.4%
Qualification	Bachelor	119	47.8%
	Bachelor and Diploma	21	8.4%
	Diploma	65	26.1%
	Master	40	16.1%
	Other	1	0.4%
	PhD	3	1.2%
Employment Type	Contract	25	10%
	Governmental	213	85.6%
	Private	11	4.4%
Work Experience	Less than 5 years	62	24.9%
	5 - less than 10 years	70	28.1%
	10 - less than 15 years	54	21.7%
	15 – less than 20 years	35	1.4%
	More than 20 years	28	11.2%
Do you have any responsibilities outside your workplace that affect your anxiety and stress?	No	124	49.8%
	Yes	125	50.2%
Region in Saudi Arabia you work	Eastern Region	11	4.4%
	Najd Region	37	14.9%
	North Region	2	0.8%
	Private	11	4.4%
	South Region	12	4.8%
	Western Region	170	68.3%
	Unknown	6	2.4%
The type of healthcare facility in which you work	Community	3	1.2%
	Educational Hospital	6	2.4%
	General Hospital	160	64.3
	Operational Administration	5	2%
	Saudi Red Crescent Authority	37	14.9%
	Specialist Hospital	1	0.4%
	Unknown	34	13.7%
In which department do you work?	Community Field Work	1	0.4%
	Diabetic and Endocrine Unit	2	0.8%
	Emergency Room	33	13.3%
	Endoscopy Department	1	0.4%
	Hematology and Oncology Unit	5	2%
	Hemodialysis Unit	5	2%
	Home Health Care	4	1.6%
	Homecare Department	1	0.4%
	Infection Control Department	1	0.4%
	Infection Control Unit	1	0.4%
	Infection control	1	0.4%
	Intensive Care Unit	14	5.6%
	Isolation Unit	3	1.2%
	Labor and Delivery Room	2	0.8%
	Medical Unit	14	5.6%
	Multiple Units	11	4.4%
	Neonatal Intensive Care Unit	11	4.4%
	Nursery	2	0.8%
	Nursing Administration	21	8.4%
	Nursing Education and Training Department	9	3.6%
	Nursing Office	9	3.6%
	Nursing Research Unit	2	0.8%
	Obstetrics and Gynecology Unit	9	3.6%
	Operation Room	11	4.4%
	Operation room	1	0.4%
	Outpatient Department	37	14.9%
	Pediatric	1	0.4%

	Intensive Care Unit		
	Pediatric Unit	15	6%
	Psychology Unit	1	0.4
	Quality and Patient Safety Department	4	1.6%
	Surgical Unit	11	4.4%
	Transplantation Unit	2	0.8%
	Unknown	4	1.6%
Have you received any training courses in infection prevention and control?	No	42	16.9%
	Yes	206	83.1%
Do you have adequate Personal Protective Equipment (PPE) in your workplace?	No	21	26.9%
	Yes	57	73.1%
Are there any patients infected or suspected to be infected by Covid-19?	No	72	29%
	Yes	176	71%
Have you ever looked after a patient infected by Covid-19?	No	186	84.5%
	Yes	34	15.5%
Have you ever looked after a patient suspected to be infected by Covid-19?	No	129	58.6%
	Yes	91	41.4%

To control for these effects, the instrumental administration items were initially randomly ordered and all the participations remained anonymous. In addition, in order to maximize statistical power, a larger sample size was recruited to provide more information about the population and so increase the power analysis. The researcher initiated a missing data analysis to determine the nature of messiness (MCAR, MAR, NMAR). The missingness mechanism of twenty-one cases was found as NMAR, imputing that it was not possible to fill in the missing responses. Additional precautions were performed to increase power, and a diversity of primary statistical analyses were used to investigate the variance in a number of different ways and minimize random error, to facilitate the replication of the study findings.

Furthermore, the researcher examined the content and construct validity to ensure whether the content of the test matched the instructional objectives, and the assessments corresponded to other variables, as predicted by a particular rationale or theory. Moreover, the researcher employed the statistical technique Confirmatory Factor Analysis (CFA) to test the power of the construct validity by studding variance within a group, in order to understand the variance and covariance of the observed indicators variables, and test the number of hypothesized factors underlying the variances in a set of measured indicator variables.

The participants in this study completed a set of standardized measures that have been extensively used in previous studies and shown to possess adequate psychometric properties. Tables 2 and 3 show additional details about measure and model testing validity and reliability. The models were examined in pooled data without any demographic classification.

Demographic questionnaire. A short statistical survey was used to determine the respondents' demographic information, including background characteristics such as: (1) gender; (2) marital status; (3) qualifications; (4) employment type; (5) work experience; (6) responsibilities outside the workplace; (7) region; (8) types of healthcare facility; (9) department; (10) training; (11) adequate PPE in the workplace; (12) patients infected; (13) caring for an infected patient; and (14) looking after a patient suspected as being infected.

ENSS (French et al., 2000) consists of a fifty-seven-item tool that is considered valid and reliable. The items of the scale were scored so that the higher the score, the greater the frequency of stress on any sub-scale. Using this tool to measure and compare the perceived levels of job-related stress and stressors ensured that the first beneficiaries would be the nursing leaders within the Saudi healthcare system, as they were in a position to understand the relevant nursing challenges. In addition, the physical health and psychological well-being of workers are central for work performance and for maintaining human resources. Hence, an analysis of the relationships between work stress and health, and then relating these to the micro-level and macro-level of national labor and social policies, has the potential to assist Saudi nursing leaders to learn from the experience of the Covid-19 pandemic to improve the health of nurses, as well as to enhance their job satisfaction and their productivity. This would ensure that the experience of living through such a crisis would minimize nursing leaders' level of uncertainty for managing, organizing, and planning for a similar event.

Table 2. Internal consistency using the Cronbach alpha values.

Scale	Mean	SD	Alpha
ENSS	1.88	0.87	0.97
Subscale			
Death and dying	1.76	1.05	0.8

Conflict with Physicians	1.96	1.03	0.78
Inadequate Emotional Preparation	1.6	1.07	0.75
Problems Relating to Peers	1.63	0.86	0.73
Problems Relating to Supervisors	2.17	1.11	0.9
Workload	2.22	1.01	0.91
Uncertainty Concerning Treatment	1.98	0.97	0.86
Patients and their Families	2.01	1.04	0.87
Discrimination	1.15	1.09	0.41

Table 3. Standardized factor loadings of the depression symptoms scale pooled over all data

ENSS (factor / Items)	Mean	Standard Deviation (SD)	Loading
Death and dying			
Performing procedures that patients experience as painful	1.76	1.31	0.570
Feeling helpless in the case of a patient who fails to improve	1.86	1.49	1.000
Listening or talking to a patient about his/her approaching death	1.25	1.59	0.940
The death of a patient	2.06	1.67	1.000
The death of a patient with whom you have developed a close relationship	1.69	1.71	1.000
Physician not being present when a patient dies	1.33	1.58	1.000
Watching a patient suffer	2.54	1.39	0.903
Conflict with physicians			
Criticism from a physician	1.88	1.45	0.671
Conflict with a physician	1.91	1.32	0.912
Disagreement concerning the treatment of a patient	1.54	1.35	0.993
Making a decision concerning a patient when the physician is unavailable	1.64	1.5	0.974
Having to organize physicians' work	1.74	1.44	0.959
Inadequate preparation			
Feeling inadequately prepared to meet the emotional needs of a patient's family	1.51	1.34	0.835
Being asked a question by a patient for which no satisfactory answer is available	1.65	1.3	0.926
Feeling inadequately prepared to help with the emotional needs of a patient	1.65	1.32	0.967
Problems with peers			
Lack of opportunity to talk openly with other unit personnel about problems in the work setting	1.89	1.42	0.652
Lack of opportunity to share experiences and feelings with other personnel in the work setting	1.64	1.33	0.866
Lack of opportunity to express to other personnel on the unit my negative feelings toward patients	1.32	1.3	0.750
Difficulties in working with a particular nurse (or nurses) in the immediate work setting	2.05	1.31	0.788
Difficulties in working with a particular nurse (or nurses) outside the immediate work setting	1.81	1.33	0.747
Difficulty in working with nurses of the opposite sex	1.18	1.22	0.615
Problems with supervisors			
Conflict with a supervisor	2.1	1.42	0.971
Lack of support from the immediate supervisor	2.09	1.46	1.000
Criticism by a supervisor	2.1	1.4	0.974
Lack of support by nursing administrators	2.51	1.4	1.000
Being held accountable for things over which the participant has no control	2.14	1.49	1.000
Lack of support from other health care administrators.	2.04	1.47	0.852
Criticism from the nursing administration	2.27	1.52	1.000
Workload			
Unpredictable staffing and scheduling	2.32	1.48	0.995
Insufficient time to provide emotional support to a patient	1.79	1.34	0.976

Insufficient time to complete all nursing tasks	2.16	1.4	0.874
Too many non-nursing tasks required, i.e. clerical work	2.62	1.46	0.977
Not enough staff to adequately cover the unit	2.79	1.36	0.914
Not having enough time to respond to the needs of the patients' families	1.93	1.42	1.000
Demands of patient classification system	1.48	1.31	0.729
Having to work through breaks	2.43	1.39	0.880
Having to make decisions under pressure	2.45	1.35	1.000
Uncertainty concerning treatment			
Inadequate information from a physician regarding the medical condition of a patient	1.72	1.38	0.777
A physician ordering what appears to be inappropriate treatment for a patient	1.68	1.44	0.911
Fear of making a mistake in treating a patient	2	1.47	0.931
A physician not being present in a medical emergency	2.05	1.55	1.000
Feeling in adequately trained for what is required	1.63	1.42	0.991
Not knowing what a patient or a patient's family should be told about the patient's condition and its treatment	1.7	1.37	0.732
Being exposed to health and safety hazards	2.88	1.33	0.714
Being in charge with inadequate experience	1.89	1.53	0.854
Uncertainty regarding the operation and functioning of specialized equipment	2.38	1.41	0.953
Patients and their families			
Patients making unreasonable demands	2.24	1.38	0.802
Patients' families making unreasonable demands	2.07	1.42	0.968
Being blamed for anything that goes wrong	2.65	1.46	0.873
Being the one who has to deal with patients' families	1.76	1.43	0.983
Having to deal with violent patients	1.67	1.56	1.000
Having to deal with abusive patients	2.21	1.51	0.999
Having to deal with abuse from patients' families	1.81	1.56	1.000
Not knowing whether patients' families will report members of staff for inadequate care	1.74	1.4	0.844
Discrimination			
Being sexually harassed	0.68	1.31	0.647
Experiencing discrimination because of race or ethnicity	1.25	1.51	0.807
Experiencing discrimination on the basis of sex	1.55	1.56	1.000
Evaluation Criteria		ENSS	Sufficiency Criteria
RMSEA	0.065		
TLI	0.772		
CFI	0.786		

A T- test for independent samples was used to test the differences between the averages of the two groups, following which they were classified into groups of demographic variables. Table 4 reveals that that the values of (t) were statistically significant for a number of demographic variables. Firstly, the female participants experienced greater levels of stress than their male counterparts when faced with conflicts with supervisors. Secondly, nurses employed on a contract stated being more stressed in relation to inadequate preparation than those working for the government. Thirdly, nurses who had not received training were more stressed in relation to discrimination and problems with peers and supervisors than nurses who had received training. Fourthly, nurses with patients who were infected (or suspected to be infected) by Covid-19 were more stressed with concerns about their patients and their families. Fifthly, nurses who had looked after a patient suspected to be infected by Covid-19 experienced additional stress related to discrimination.

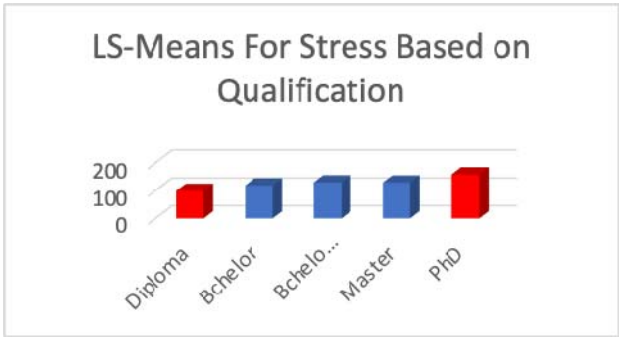
In addition, an overall comparison was employed to identify nurses' perceived stress, based on: (1) gender; (2) employment type; (3) external responsibilities; (5) having received training; (6) the availability of PPE; and (6) patient infectious status. The results revealed that these were not statistically significant in nurses' stress based on previous variables.

Table 4. t-test results comparing groups of demographic variables of participants

		Problems with supervisors				
Variables	Groups	M	SD	df	t	Sig.
Gender	Males	18.860	9.11	243	-2.82	0.005*
	Females	21.225	8.98			

		Inadequate preparation				
Employment Type	Governmental	10.775	5.78	241	-2.14	0.033*
	Contract	11.412	5.64			
		Problems with peers				
Received training	Yes	10.493	5.41	245	-2.25	0.025*
	No	12.667	7.01			
		Problems with supervisors				
	Yes	13.165	6.26	243	-2.36	0.019*
	No	15.756	7.28			
		Discrimination				
	Yes	6.181	4.58	245	-2.11	0.035*
	No	7.833	4.77			
	Patients and their families					
Patients infected by the Covid-19	Yes	17.982	8.36	244	2.36	0.019*
	No	15.194	8.61			
	Patients and their families					
Patient suspected to be infected	Yes	19.011	8.07	216	2.21	0.028*
	No	16.469	8.57			
	Discrimination					
	Yes	7.367	4.90	217	2.06	0.040*
	No	6.031	4.57			
*Significant at 0.005						

Overall ANOVA findings revealed an overall statistically significant model, F (4, 242) =3.51, p =0.003. As can be seen in Figure 1, there were statistically significant differences between nurses with a diploma degree (M=98.98) and those with a doctorate (M=158.33).



4. Discussion

This study found that female participants experienced greater stress than their male counterparts when it came to problems with supervisors. According to the Saudi General Authority for Statistics report (2018), 61.8% of nurses in SA are female. Two studies undertaken with a non-Arab population revealed that, when most managers are female, their subordinates tend to have less satisfaction with their job (Choi, 2013; Grissom et al., 2012). In a recent Saudi study, nurses reported higher levels of job satisfaction when their managers were male (Alghamdi et al., 2018), demonstrating the impact of gender on styles of leadership.

The current study did not ascertain whether the supervisors of the female participants were male or female. However, Berdahl et al. (2018) pointed out that a masculine work environment can play host to "masculinity culture contests", in which social pressures to conform to gendered behavior can result in a confusion between improved performance and masculine performance, which may lead to an adverse impact on the mental health of employees (Berdahl et al., 2018). Fowler (2017) as cited in Berdahl et al. (2018) described how male managers generally have a combatant style with their colleagues, including the use of 'one-upmanship' and seeking to sabotage their supervisors in order to obtain their positions. Fowler (2017) described such an environment as a 'Game-of-Thrones' (p. 423).

On the other hand, it appears to be assumed that subordinates can respond in a different way to identical behavior in a female supervisor (Eagly & Karau, 2002; Johansson & Wennblom, 2017). In addition, Garrosa Hernández and Gálvez Herrer (2013) indicated that similar stressors may exert a separate impact according to gender. One the other hand, Liu, Spector, and Shi (2008) stated that males can demonstrate more intense emotional reactions to conflict in comparison to females, as the latter are believed to possess more sophisticated social skills, allowing them to handle conflict more effectively than males.

Moreover, this study found that nurses employed on a contract experienced greater stress in relation to inadequate preparation than those employed by the government. This is particularly so as job insecurity is considered one of the most stressing indicators for workers, resulting in adverse mental health (Dekker & Schaufeli, 1995). Greenhalgh and Rosenblatt (1984) defined the concept of job insecurity as "the perceived powerlessness to maintain desired continuity in a threatened job situation" (p. 438). In particular, such job insecurity has a considerable influence on the mental health of agency workers, which can lead to psychological morbidity (Virtanen et al., 2005; Virtanen et al., 2011). Kompier et al. (2009) compared five types of employment contract, demonstrating that temporary workers experience lower levels of autonomy, a higher dynamic workload, and are more likely to be involved in repetitive work. Contract employers also reported greater symptoms of depression and lower work satisfaction. Furthermore, Kurtessis et al. (2017) stated that a meta analytic evaluation found that working within organizations that fail to fulfill their workers' socio-emotional needs (i.e. approval and esteem) has a detrimental impact on psychological well-being (Kurtessis et al., 2017). However, the researcher acknowledges a limitation in the current study as being the omission of determining types of temporary contract, particularly whether these included the possibility of leading to a permanent post, due to a number of variations

in the concept of 'non-permanency' which can impact on the level of stress related to job insecurity (Kompier et al., 2009).

Furthermore, this study found that nurses who had not received training were more stressed in relation to discrimination and problems with peers and supervisors than nurses who had been given training. However, it should be noted that this study was conducted in May 2020, when the situation concerning COVID-19 was still developing. At the time, both governments and media worldwide were continuously accentuating the need for preventive measures, but there remained a lack of knowledge concerning the transmission of the disease, along with its implications for health, and the potential for the development of a vaccine (Khalid et al., 2021). Such uncertainty can result in nurses, and other healthcare providers, feeling extremely stressed and powerless. This can be increased by ambiguity and vagueness about their anticipated role, as well as contradictory expectations, and a lack of interpersonal relations with coworkers (Sinha et al., 2021). Furthermore, previous epidemics and pandemics (i.e. SARS and the H1N1 influenza) have resulted in nurses being psychologically prepared to cope with such disasters. However, the severe shortage of PPE at the start of the Covid-19 pandemic, along with the high risk of exposure of frontline nurses, had the potential to inflict psychological harm (Huang et al., 2020). In addition, working in a supervisory position, accompanied by doubt concerning the tasks to be performed, as well as being responsible for the functions of others, can contribute to levels of stress (Srivastava & Singh, 1981). This study therefore identifies these aspects as generating issues between the supervisors and the nursing staff.

This study also found that nurses with patients infected (or suspected to be infected) by Covid-19 were more stressed when it came to dealing with patients and keeping their families safe. This was supported by Assadi et al. (2019), who concluded that emotional stress causes turmoil in the relationship between nurses and patients and their families. Further aspects contributing to stress were found to consist of the continuous mortality of patients and the pervasive atmosphere of death (Awajeh et al., 2018). Elbejjani et al. (2020) also highlighted the relationship between anxiety and exposure to varied working conditions. This indicates that living with a family member who is vulnerable can also worsen the mental wellness of the nurses working with infected patients, as this makes them particularly fearful of transferring the disease to members of their household (Huang, Lei, et al., 2020; Medina Fernández et al., 2021), and can accordingly influence how they deal with Covid-19 patients and their relatives. Singh (2009) emphasized that the indirect impact of extra-organizational factors can influence individual stress, performance, and overall productivity in the workplace.

The study also found that nurses caring for patients suspected to be infected by Covid-19 experienced stress related to the potential for discrimination, which has been found to be a serious issue and to have a considerable negative impact on the well-being of nurses (Labrague et al., 2021). During the outbreak of an infectious disease, healthcare professionals are considered a critical source of infection, with research revealing that nurses practiced self-isolation to deal with such public discrimination and stigmatization (Liu et al., 2012; Robertson et al., 2004). Cheung et al. (2018) reported that discrimination has significant effect on nurses' psychological well-being, with a commensurate influence on their job satisfaction. This suggests the need to combat such labelling of nurses, to be replaced by gratitude, appreciation, and respect**.** It also needs to be acknowledged that they wear unbearably heavy PPE, which prevents them from drinking, eating, and going to the toilet, leading in some cases to further physical exhaustion, i.e. dehydration, constipation, and facial skin damage (Kim, 2018; Sun et al., 2020; Moradi et al., 2021).

Furthermore, this research found statistically significant differences between nurses with a diploma degree (M=98.98) as opposed to those with a doctorate degree (M=158.33). Nunes et al. (2021) supported this finding, noting that holders of higher education qualifications (i.e. Master and PhD degrees) demonstrate more negative perceptions of the provision for patient safety in relation to work conditions. Zhao et al. (2019) also reported that a higher level of education can increase the criticality of healthcare workers regarding issues related to patient safety at the workplace. Thus, when an individual is knowledgeable about the infection mechanism and its ramifications, he or she will experience greater stress in attempting to protect themselves from infection. This was supported by a study identifying those with a higher education level as scoring higher in knowledge (Khalid et al., 2021). However, Hossain et al. (2020) emphasized that greater awareness reduces the fear associated with Covid-19, thus supporting the hypothesis that a lower level of knowledge of a particular topic could lead to the construction of myths and misleading beliefs.
In addition, a further study found higher levels of workplace stress among those with lower levels of educational qualifications (Huang, Xu, et al., 2020), potentially related to having a higher level of emotional intelligence and therefore more coping strategies. Two surveys undertaken in Hong Kong (So et al., 2004) and Qatar (Bener & Al-Khal, 2004) during SARS outbreaks also demonstrated similar outcomes. This indicates that a sufficient level of knowledge can facilitate the establishment of preventive measures, as well as the construction of positive attitudes, and the enhancement of positive behaviors and perceptions. This is significant as attitudes toward illness have a considerable influence on

the effectiveness of individual coping mechanisms and behaviors.

5. Conclusion

This study has established a broad understanding of the significant influence of work-related factors on the stress level of nurses during pandemics. It also found that the emergence of Covid-19 as a novel infectious disease increased the uncertainty of nurses and increased their work-place stress. In addition, a number of variables (i.e. gender, type of employment, training and dealing with infected patients) were shown to have a correlation with the negative mental well-being of nurses. The stress experienced by healthcare providers plays a substantial role in patient safety and satisfaction, as well as the survival of an organization. The results of this study can therefore provide insights to nurses and their leaders, including the need to consider stress indicators and seek to eliminate or control them in a comprehensive manner.

As cross-sectional studies simultaneously evaluate exposure and outcome, this research was unable to establish a true cause and effect relationship. Thus, it needs to be recognized that the variables of the relationships investigated in this study may vary across organizations and over time. The researcher also acknowledges that the sample size was insufficient to ensure the generalizability of the findings. It is recommended that all the factors identified as resulting in work-related stress in this study, which should be undertaken longitudinally on a larger population. This would facilitate more effective preparedness and the design of a response plan to minimize the influence of a similar situation on the nurses' mental health and performance, based on a true cause and effect relationship.

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