

Impact of Nurses Work Environment during COVID 19 on the Perception of Workload and Awareness of COVID 19

Ashwaq Ayidh M Alosaimi^{1*}, Hind Mohammed al Rashidi², Abdulrhman Ibrahim I Alkhalaf³, Hasan Maqad H Alotaibi⁴, Shuruq Nasser Alshahrani⁵, Hend Ali Alresheedi⁶

¹Nursing Specialist, General Administration of Health Programs and Chronic Diseases in mother's health, Saudi Arabia
<https://orcid.org/0000-0001-5423-4804>

²Nursing specialist, Al Yammamh Hospital, Saudi Arabia, <https://orcid.org/0000-0002-5982-8174>

³Nursing Specialist, General Directorate of Health Affairs in Riyadh, Saudi Arabia, <https://orcid.org/0000-0002-4385-3252>

⁴Nursing Specialist, Sharq Health Center in Dawadmi, Saudi Arabia

⁵Clinical Instructor - King Saud Medical City, Riyadh, Saudi Arabia, <https://orcid.org/0000-0003-4503-9585>

⁶Nurse Specialist, work in General Directorate of Health Affairs in Riyadh City, Saudi Arabia, <https://orcid.org/0000-0001-9932-0079>

DOI: [10.36348/sjnhc.2021.v04i08.006](https://doi.org/10.36348/sjnhc.2021.v04i08.006)

| Received: 08.07.2021 | Accepted: 12.08.2021 | Published: 20.08.2021

*Corresponding author: Ashwaq Ayidh M Alosaimi

Abstract

Background: The COVID 19 pandemic impose dramatic change in hospital work environment and nursing work environment. This study aims to assess the working Practice Environment and its relation to their perception of workload and their awareness of COVID 19. **Methods:** The study uses a cross-sectional descriptive exploratory design. The target Population was staff nurses working in selected settings. The study implemented a convenience sampling technique to incorporate nurses working in any of the predetermined settings who were willing to participate, and the total number was 110 nurses. Data were collected by employing an online self-administered questionnaire, which consists of five parts. The first part includes the socio-demographic profile. The second part includes the Practice Environment Scale of the Nursing Work Index (PES-NWI) and other tools include information that assessed the perception of the workload during COVID-19 and, therefore, the awareness about COVID-19 by nurses. **Results:** One hundred ten nurses participated in this study; nurses were moderately high perceived to their work environments, and there was an association between the characteristics of participants, perception of workload, and awareness in relation with the work environment. **Conclusion:** This study explored important aspects of nurses' work environments and how nurse awareness and perception of workload during covid 19 impacts it. There was an association between nurse's perception of their work environment and their perception of the workload during the pandemic. The nurse's high awareness of COVID 19 was associated with positive perception of work environments.

Keyword: Practice Environment, awareness of COVID 19, nursing work environment.

Copyright © 2021 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Coronavirus disease (COVID-19) was first described in Wuhan, China in December 2019; and now is the worldwide pandemic. Most of the affected personnel have milder illness (80%), 15% severe illness (require oxygen) and only 5% require ICU care [1]. The infected patients who are critically ill mostly require early intubation and mechanical ventilation. Other complications include septic shock and multi-organ failure including acute kidney injury and cardiac injury [2]. Older age and comorbid diseases, like hypertension, chronic obstructive pulmonary diseases (COPD), and diabetes increase risk of death among infected patients [3]. The virus is very contagious and spread via

respiratory droplets, direct and indirect contact, and sometimes airborne routes. the foremost common symptoms include fever, fatigue, dry and constant cough, and shortness of breath [4].

Large number of the infected patients develop serious breathing disorders and wish advanced management for an extended time. As there is a limited number of appropriate mechanical ventilators; there's a risk that a growing number of patients with advanced critical stages of breathing disorders won't get any treatment and accordingly will die; despite the very fact that the staff have the knowledge and practice of the way to save them. There in the situation all what the staff can do is to watch and provides palliative care [5].

This in fact is an extreme ethical provocation for the staff. The issues are going to be worse for doctors and nurses who face the difficult decisions in concrete situations than for nonmedical staff, and at an equivalent time many of their colleagues are on leave because they're infected with the COVID-19. Thus, with increasing numbers of patients and negative working practice environment, there'll be staff shortage[6].

The negative psychosocial risk factors that worsening the work environment include extremely high demands, complete lack of control, lack of institutional support in many workplaces, and additionally lack of reward, extreme work overtime and shift work schedules. there's an outsized volume of scientific literature supporting that there's increased risk of developing depression, burnout syndrome, and myocardial infarct when employees are exposed to such situations[6, 7].

The work environment of nurses and its associations with quality of care is a neighborhood of research that has gained attention in recent decades [8]. A widely used approach in such studies is to explain the services from the bedside perspective, by surveying the employees' perceptions of the characteristics of their daily work practice environment. Although the results are inconclusive, studies on the subject support assumptions about associations between nurses' work environments and quality patient care and outcomes, also there are associations with organizational outcomes like turnover and retention[9, 10].

Protection of the health care workers during terrorism and pandemics are often done by monitoring the working environment carefully. When resources either material or personnel are lacking; innovative collaboration with the encompassing society could pay off. Supervisors have the responsibility to monitor and follow the health of the staff, save crash courses in critical care for medical students and use of protective clothes [11].

In response to the COVID-19 outbreak, the structure and organization of health care system at the hospital level had to be reconsidered and reshaped; moreover action plans should be developed, implemented, and followed as new challenges kept emerging. Employers are required to make sure that workplaces are safe[12]. Within the context of COVID-19, employers should execute and sustain measures that mitigate unnecessary risk of exposure to the virus by the workers and patrons. Work-related exposure to infections can occur anytime at the workplace, during work, or during visit a working setting with community transmission, as well as on the way to and from the work. The danger of work-related exposure to COVID-19 depends on the probability of coming into close (less than 1 meter or 3 feet) or frequent contact with COVID-

19 infected people or with contaminated surfaces and objects. Employers and managers in consultation with workers should assess their work environment, the tasks, and responsibilities of their employees for work-related exposure to COVID-19. These assessments should be regularly updated in a line with new management strategies [13].

Corona virus has come as terrorism to all the health systems worldwide, as all the health sectors now aim to boost their abilities and increase safety of its environment to scale back mortality and morbidity among the working health-care staff and patients. On October 23, 2020, Saudi Arabia have 344,157 Confirmed covid-19 cases, and 5,264 people have died from COVID-19 with recovery rate 96.1% [14]. The dominion of Saudi Arabia put a selected strategic plan consistent with its special health sector to boost the standard of the practice environment in confront of COVID -19.

The key findings from this study may help recognize the magnify of the matter, because the positive environment provides nurses with a chance to reinforce their professional practice, access advancement opportunities, and gain higher autonomy at their respective places of work. Such environments reduce nurses' intentions to go away their jobs as compared to the case of poor or negative environments. Also, the results will help to draw relevant recommendations, which can be helpful within the effort to intervene the matter. Furthermore, it is going to supply information for future research directions and elicit new strategies for confronting the pandemic.

LITERATURE REVIEW

In hospitals where nurses report positive working practice environment; nurses are less likely to go away the hospital and patients are more satisfied with their hospital stay and services and rate their hospitals more highly. Nurses are concerned with the standard of patient care in their hospital, analyze and monitor risks and hazards at the workplace especially at the terrible situations, as they're important tools to realize and maintain healthy working conditions. In recent years, there's a growing awareness of working practice environment, that's often reflected by an amendment to the security and Health at Work Act [15].

In developing and implementing workplace action plans for prevention and control of COVID-19, conditions associated with risk at the working environment should be assessed. Co-operation between managers and workers and their representatives should be an important element of workplace related preventive measures. Workers should be properly consulted and every one of workers should be told about the measures introduced, using specific risk

communication and community engagement approaches[16].

An international study by [17], evaluated various work conditions and their associations with patient outcomes; found that the work conditions were grouped in 10 concepts; autonomy, philosophy emphasizing quality of clinical care, nurse participation, supportive managers, collaborative relationships with physicians, collaborative relationships with peers, staffing, decentralization, patient centered climate, and busyness. The researcher evaluated the relation between each condition and patient outcome.

In China a study found that approximately 44% of hospitals have poor work environments as reported nurses. Inadequate staffing that didn't consider the ratio of patients to nurses and availability of efficient resources were the most important issues that surrounded the practice work environment. Research that has been implemented in the U.S and Europe pointed to the importance of the adequacy of staffing and a supportive work environment [10]. Generally, research findings at China were worse compared to its European counterparts, as approximately half the studied nurses reported lack of confidence within the management of the hospitals during which they work and they think that management won't help to enhance services to their employees[2].

Within the U.S. hospitals found that Filipino and Chinese nurses from collectivist cultures are more likely to rate their work environments as better and are less likely to go away their jobs. Although the correlation between cultural orientation and the perception of practice environment was moderate ($r=-.24$), it had been significant ($p <.05$). The findings from different countries didn't differ significantly, there's still a requirement to gauge these relationships within the context of Saudi Arabia due to the potential influence of culture and population diversities on the work practice environment [18]. A study on the critical care nurses in South Africa in 2012 by Klopper *et al.*, showed consistent results by reporting that nurses had a high level of burnout due to dissatisfaction with several factors in their work practice environment like wages, opportunities for advancement, inadequate staffing, and lack of participation in hospital affairs [19].

Choi (2013) stated that around two-thirds (60%) of the studied nurses reported that the standard of their work environment was very poor. Among the aspects of the work environment, the dimension of staffing was rarely adequate, hence making it hard to supply safe care [20].

Cotezee *et al.*, (2013) stated that in the private hospitals, slightly more than half nurses (52%, 54%) had intention to go away their jobs

within subsequent year rated their practice environment as fair or poor respectively, less than half (46%) of the studied nurses experienced a high level of burnout. When examining the general public hospitals, the results are comparatively worse where in slightly less than three-quarters (71%) of nurses reported fair to poor work environment [21].

In Saudi Arabia, the chronic problem of the nurse shortage has led employers to recruit more international nurses. This creates a multicultural workforce that is evident in many hospitals. For instance, King Abdulaziz Medical City hospital in Saudi Arabia has nurses from quite 44 different nationalities [22]. It's necessary to concentrate to the multicultural work setting that wasn't considered (if existed) in any of the reviewed international studies. It is unknown whether the cultural diversity in Saudi hospitals exhibits different dynamics and interactions between practice environment and job outcomes. For these reasons, there is a critical got to conduct practice environment studies in hospitals at Saudi Arabia.

In general, it is imperative for hospitals to take a position more in improving work conditions like provide adequate resources and staff to hold out the work, encourage building good relationships with colleagues, and permit nurses to participate in hospital affairs and institutional decision-making, also provide opportunities for career development for all nurses. However, due to the differences between Western countries and Saudi Arabia in terms of cultural context, and therefore the structure of the nursing workforce, prioritizing and tailoring such interventions must believe studies within the country to make sure their relevance.

AIM OF THE STUDY

This study aims to assess the working Practice Environment and its relation to their perception of workload and their awareness of COVID 19.

METHOD

This study uses a cross-sectional descriptive exploratory design. It collected the data from different departments, including the Intensive care unit (ICU), the emergency department, and the medical departments specialized for isolation of patients with COVID 19 in Aldawadmi Hospital, Kingdome of Saudi Arabia. The target Population was staff nurses working in selected settings. The study implemented a convenience sampling technique to incorporate nurses working in any of the predetermined settings who were willing to participate, and the total number was 110 nurses.

Measurement

Data were collected by employing an online self-administered questionnaire, which consists of five parts. The first part includes the socio-demographic

profile. The second part includes the Practice Environment Scale of the Nursing Work Index (PES-NWI) by Lake [23] to assess the working environment by nurses. The third and fourth parts include information that assessed the perception of the workload during COVID-19 and, therefore, the awareness about COVID-19 by nurses [16].

Data collection

The questionnaires were given to the nurses directly while they were at work; by meeting the head nurse in each department and explained to them the idea of the study and informed participants that they could choose to withdraw from the study at any time without consequences, with maintaining the confidentiality of the participant's identities through the data collection process. The researchers distributed 150 Questionnaires in all units, and only 110 questionnaires were completed.

Statistical Analysis

Data were coded for analysis by the SPSS program. The demographic characteristics and elements at the health care facility to form the environment safe were analyzed using descriptive statistics, like frequencies, percentages, means, and standard deviations. The one-way ANOVA were used to determine the presence of serious difference and relationship, respectively, between variables like the standard of the Practice Environment, Perception of the

work and working environment during COVID-19, and Awareness on COVID-19 additionally to descriptive statistics and extent of significance was set at $P \leq 0.05$.

Ethical Considerations

This study has been submitted to and obtained ethics approval from the Research Ethics Committee at King Saud University and the Ministry of Health in Saudi Arabia.

RESULT

A total of 110 nurses responded to the electronic questionnaire, resulting in a response rate of 79%. The participant's demographic characteristics were presented in table 1. Participants between 25-30 years constitute 56.4% of the study sample, 23.6% of them are below 25 years old, while 10.0% of them are 30- <35 years. Regarding their gender, more than half (66.4%) of them are males, while 33.6% of them are females. On the other hand, 81.8% of the study participants are single, while 17.3% are married. In addition, 37.3% of the participants have a bachelor's degree in nursing, while 36.4% are postgraduate (master and Ph.D.). Regarding participants' jobs, 70.0% are staff nurses, while 21.8% are assistant Nurse. 43.6% have experienced 1 -< 5 years, while 34.5% have experienced ten years and more. Moreover, 47.3% of participants are working in an emergency department, while 35.5% are working in the medical department.

Table-1: Sample Distribution According to the Participants' Age, Gender, Marital Status, and Education (n=110)

Variables	Number	%
Age groups		
Below 25 years	26	23.6
25- <30 years	62	56.4
30- <35 years	11	10.0
≥35 years	11	10.0
Gender		
Male	73	66.4
Female	37	33.6
Marital status		
Single	90	81.8
Married	19	17.3
Divorced	1	.9
Education		
Diploma in	29	26.4
Bachelor's degree	41	37.3
Post-graduate	40	36.4
Nationality		
Saudi	92	83.6
Other Arab countries	2	1.8
Asian	16	14.5
Job		
Assistant Nurse	24	21.8
Staff Nurse	77	70.0
Nurse Leader/head nurse/manager	9	8.2
Experience		
1 -< 5 years	48	43.6

5-<10	24	21.8
10 and more	38	34.5
Department		
Emergency	52	47.3
ICU	19	17.3
Medical	39	35.5

Workload state in departments seen in figure 1. The figure shows that 48.2% of the study participants perceptions of workload in departments with the above

capacity workload, 36.4% of their work in the usual workload, while 9.1% work in overflowing departments.

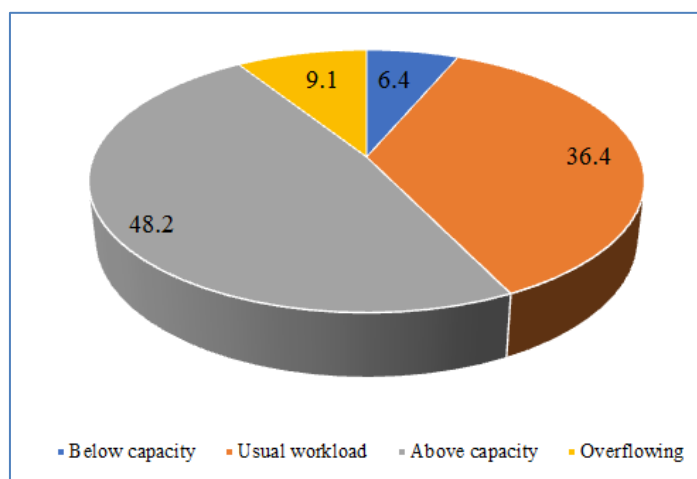


Fig-1: Workload within working departments

Table 2 illustrates that the nurses perceived nurse participation in hospital affairs moderately, and nurses perceived highly to the nursing foundation for quality of care. It also shows that the nurses perceived moderately to nurse manager ability, leadership, and

support of nurses and to staffing and resource adequacy. Nurses perceived highly to collegial nurse-Physician Relations moderately to staffing and resource adequacy he above table illustrates that the nurses perceived highly to collegial nurse-physician relations.

Table-2: Nursing perception to nursing work environment.

Nursing work environment subscales	X±SD
Nurse Participation in Hospital Affairs	2.55± .69
Nursing Foundation for Quality of Care	2.33 ±0.60
Nurse Manager Ability, Leadership, and Support of Nurses	2.58± .78
Staffing and Resource Adequacy	2.73±. 83
Collegial Nurse-Physician Relations	2.37±.7 1

Table 3 showed significant differences between age groups in relation to nursing participation in hospital affairs; the lowest mean score was 2.24 for those Below 25 years. The group, while the highest mean score 2.77 were for the age group between 30≥35 yrs. The table also shows significant differences p-value 0.00 between the age groups in relation to the nursing foundation for quality of care; the lowest mean score 1.74 for those Below 25 years. The group, while the highest mean score of 2.28 was for the age group between 30-35 yrs. It showed significant differences p-value 0.03 between the age groups in relation to nursing manager ability, leadership, and support of nurses; the lowest mean score 2.20 for those Below 25 years.

There were significant differences between groups of different educational levels in relation to the nursing foundation for quality of care with a p-value of 0.02 only and no significant differences with other aspects of the nursing practice environment. Nurse's experience showed significant differences with all categories of nursing work environment except Collegial Nurse-Physician Relations; there were no significant differences. There were significant differences between the groups from different departments in relation to nurse participation in hospital affairs, nursing foundation for quality of care, nurse manager ability, leadership, and support of nurses, and collegial nurse-physician relations.

Table-3: Association between nurses' characteristics and their perception of the nursing work environment

Nurses' Characteristics	Nurse Participation in Hospital Affairs		Nursing Foundation for Quality of Care		Nurse Manager Ability, Leadership, and Support of Nurses		Staffing and Resource Adequacy		Collegial Nurse-Physician Relations		
	X±SD	F(P)	X±SD	F(P)	X±SD	F(P)	X±SD	F(P)	X±SD	F(P)	
Age groups	Below 25 years	2.24±0.57	4.01 (0.01) *	1.74±0.5	3.08 (0.02) *	2.20±0.67	2.78 (0.03) *	2.55±0.71	1.90 (0.12)	2.02±0.58	3.65 (0.10)
	25- <30 years	2.63±0.72		2.27±0.76		2.60±0.75		2.74±0.85		2.14±0.77	
	30- <35 years	2.77±0.64		2.28±0.6		2.50±0.73		2.79±0.8		2.35±0.8	
	≥35 years	2.46±0.73		2.11±0.72		2.35±0.83		2.64±0.88		2.30±0.67	
Education	Diploma	2.49±0.68	1.86 (0.15)	2.17±0.62	3.27 (0.02) *	2.43±0.76	1.86 (0.15)	2.73±0.85	0.01 (0.98)	2.23±0.69	1.77 (0.17)
	Bachelor's degree	2.69±0.68		2.34±0.79		2.58±0.74		2.73±0.74		2.37±0.82	
	Post-graduate	2.57±0.79		2.10±0.77		2.51±0.91		2.76±1.03		2.19±0.86	
Experience	1- <5 years	2.6±0.71	4.85 (0.00) *	2.27±0.71	4.60 (0.00) *	2.61±0.83	5.03 (0.00) *	2.70±0.83	3.91 (0.00) *	2.35±0.7	0.90 (0.43)
	5- <10	2.66±0.69		2.33±0.71		2.58±0.75		2.79±0.81		2.37±0.77	
	10 and more	2.44±0.65		2.11±0.6		2.34±0.71		2.69±0.84		2.13±0.67	
Department	Emergency	2.60±0.73	0.59 (0.62)	2.32±0.78	2.00 (0.11)	2.57±0.75	1.33 (0.26)	2.66±0.79	0.78 (0.50)	2.39±0.83	4.12 (0.00) *
	ICU	2.59±0.68		2.27±0.66		2.39±0.80		2.80±0.99		2.34±0.67	
	Medical	2.51±0.67		2.18±0.63		2.47±0.79		2.79±0.86		2.28±0.69	

- X±SD: mean and standard division
- F(P): one way ANOVA and P value
- * Significance at P ≤0.05.

As seen in table 4 there were significant differences between the perception of the workload in relation to all categories of nursing work environment except nurse Nursing Foundation for Quality of Care,

and collegial nurse-physician relations there were no significant differences. There were significant differences between Awareness of COVID-19 and perception of the workload.

Table-4: Association between nurses' Awareness on COVID-19, their perception of the nursing work environment and perception of workload

		Perception of the work	F(P)
nursing work environment	Nurse Participation in Hospital Affairs	2.57±0.64	1.00 (0.01)
	Nursing Foundation for Quality of Care	2.46±0.73	1.55 (0.19)
	Nurse Manager Ability, Leadership, and Support of Nurses	2.75±0.88	4.85 (0.00)
	Staffing and Resource Adequacy	2.82±0.78	4.01 (0.01)
	Collegial Nurse-Physician Relations	2.57±0.64	1.80 (0.14)
Awareness on COVID-19	Low	12	3.60 (0.01)
	Fair	52	
	Good	46	

- X±SD: mean and standard division
- F(P): one way ANOVA and P value
- * Significance at P ≤0.05.

DISCUSSION

The study assessed the quality of nurses' work environments during COVID-19 by using (PES-NWI). This study addressed the nursing work environment into five categories; Nurse Participation in hospital affairs, the nurses perceived "moderate" to participate in hospital affairs. There were significant differences in this study among the participants in this category concerning age nurse's age between 20 ≥30 perceived

less participation in hospital affairs than others age groups. The nurses who had over 5 >10-year experience perceived less participation in hospital affairs.

The second category of nursing work environment was the Nursing Foundation for Quality of care; the nurses reported high perceptions towards this category. A qualitative study conducted to understand nurses' perspective of how the nursing work

environment is related to positive patient experiences[24]. Other study reported that the nurses rate the highest score in foundations for quality of care compare to other categories[25]. The current study showed that there were significant differences between age groups in relation to the nursing foundation for quality of care. Nurses age between $20 \geq 30$ perceived less than other age groups especially those nurses over the age of 40. In the third category, Nurse Manager Ability, Leadership, and support of nurses, the nurses report moderate agreement about this category. It was similar to other studies done in Saudi Arabia [26].

The fourth category of nursing work environment was Staffing and Resource Adequacy, the nurse's perceived moderate perception related to this category. In a study conducted by Kalisch & Lee, the nurses were more satisfied when staffing overall was adequate [27]. In this study, there was significance association between collegial nurse-physician relations and age; the nurses' $20 \geq 30$ years reported lower agreement compared to those over 30 years of age. Critical care nurses reported lower agreement on the nurse-physician relationship than nurses who are not working in the critical area. The nurses with $5 > 10$ years of experiences perceived less than those they had 10 years' experience or more in relation to the nurse-physician relationship.

The challenges of COVID-19 showed the effect of the nursing workload in a certain department, and this work could be associated with a high hospitalization rate during the pandemic. The current study described the workload as above capacity but not overflowing, similar to other studies conducted in China, which showed that nurses perceived low workload [4]. It might be explained by the hospital management of the placement of the cases and the availability of enough staff in these hospitals. It was also explained by the nurse's perception of their work environment, which showed perception of manager Ability, Leadership, and Support of Nurses and Staffing and Resource Adequacy was a statistically significant relationship with perception of the work environment. This result is similar to other studies that showed the positive impact of management support and staffing on the nurse's perception of workload [28, 4].

Important in this study is that nurses had aware of COVID-19. It could be because of the ongoing effort by MOH to inform their staff about the updates by email, SMS, and on their official website. Note that Saudi nurses encounter various illnesses of the coronavirus, such as MERS. This experience helps nurses learn valuable lessons from treating these illnesses and enhancing their ability to plan, adapt, and respond effectively in an outbreak [29]. The level of awareness was higher among the nurses with experience of more than ten years and those holding bachelor's degrees [30]. Also, more than having the

study participants were studies that explain the good level of awareness among the participants as indicated by several research nurses with experience in MERS-COV have greater perception and awareness in other countries such as Iran, Saudi Arabia, and Korea[31-33].

A high awareness score had a statistically significant relationship with the perception of workload among the nurses. These results might imply confidence among nurses when they face a public health crisis, making them perceive this as a temporary work-related issue only.

CONCLUSION

This study explored important aspects of nurses' work environments and how nurse awareness and perception of workload during covid 19 impacts it. There was an association between nurse's perception of their work environment and their perception of the workload during the pandemic. The nurse's high awareness of COVID 19 was associated with positive perception of work environments. Further research is needed to understand how improving the nurse's work environment can improve the nurse's perception of workload during a time of crisis.

Conflict of interest

The authors declared no potential conflicts of interest concerning any aspects of this study.

ACKNOWLEDGEMENTS

The authors would like to thank the nurses who participated in this study, and they appreciate their efforts against COVID 19.

REFERENCE

1. Surveillances, V. (2020). The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19)—China, 2020. *China CDC weekly*, 2(8), 113-122.
2. Yang, X., Yu, Y., Xu, J., Shu, H., Liu, H., Wu, Y., & Shang, Y. (2020). Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *The Lancet Respiratory Medicine*, 8(5), 475-481.
3. Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., & Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The lancet*, 395(10223), 497-506.
4. Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., & Cao, B. (2020). Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *The lancet*, 395(10229), 1054-1062.
5. Theorell, T. (2020). COVID-19 and working conditions in health care. *Psychotherapy and psychosomatics*, 1.
6. Theorell, T., Jood, K., Järvalm, L. S., Vingård, E., Perk, J., Östergren, P. O., & Hall, C. (2016). A systematic review of studies in the contributions of

- the work environment to ischaemic heart disease development. *The European Journal of Public Health*, 26(3), 470-477.
7. Theorell, T., Hammarström, A., Aronsson, G., Bendz, L. T., Grape, T., Hogstedt, C., ... & Hall, C. (2015). A systematic review including meta-analysis of work environment and depressive symptoms. *BMC public health*, 15(1), 1-14.
 8. Needleman, J. (2015). Nurse staffing: the knowns and unknowns. *Nursing Economics*, 33(1), 5-8.
 9. Flynn, L., Liang, Y., Dickson, G. L., & Aiken, L. H. (2010). Effects of nursing practice environments on quality outcomes in nursing homes. *Journal of the American Geriatrics Society*, 58(12), 2401-2406.
 10. Aiken, L. H., Sloane, D. M., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., ... & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The lancet*, 383(9931), 1824-1830.
 11. Goh, K. J., Wong, J., Tien, J. C. C., Ng, S. Y., Duu Wen, S., Phua, G. C., & Leong, C. K. L. (2020). Preparing your intensive care unit for the COVID-19 pandemic: practical considerations and strategies. *Critical Care*, 24, 1-12.
 12. Shang, Y., Pan, C., Yang, X., Zhong, M., Shang, X., Wu, Z., ... & Chen, D. (2020). Management of critically ill patients with COVID-19 in ICU: statement from front-line intensive care experts in Wuhan, China. *Annals of intensive care*, 10(1), 1-24.
 13. Griffin, K. M., Karas, M. G., Ivascu, N. S., & Lief, L. (2020). Hospital preparedness for COVID-19: a practical guide from a critical care perspective. *American journal of respiratory and critical care medicine*, 201(11), 1337-1344.
 14. Weiseng. (2021). "Saudi Arabia COVID-19 Corona Tracker," *Corona Tracker*. <https://www.coronatracker.com/country/saudi-arabia/> (accessed Aug. 04, 2021).
 15. "Safety Management. (2021). A safe workplace is sound business | Occupational Safety and Health Administration." <https://www.osha.gov/safety-management> (accessed Aug. 04, 2021).
 16. Acharya, S., Maharjan, K., Dongol, D., & Ghimire, A. (2020). Awareness of COVID-19 and perception of work satisfaction among healthcare workers at Patan Hospital, Nepal. *Journal of Patan Academy of Health Sciences*, 7(1), 31-36.
 17. BAE, S. H. (2011). Assessing the relationships between nurse working conditions and patient outcomes: systematic literature review. *Journal of nursing management*, 19(6), 700-713.
 18. Cheng, C. Y., & Liou, S. R. (2011). Intention to leave of Asian nurses in US hospitals: does cultural orientation matter?. *Journal of clinical nursing*, 20(13- 14), 2033-2042.
 19. Klopper, H. C., Coetzee, S. K., Pretorius, R., & Bester, P. (2012). Practice environment, job satisfaction and burnout of critical care nurses in South Africa. *Journal of nursing management*, 20(5), 685-695.
 20. CHOI, S. P. P., Cheung, K. I. N., & PANG, S. M. C. (2013). Attributes of nursing work environment as predictors of registered nurses' job satisfaction and intention to leave. *Journal of nursing management*, 21(3), 429-439.
 21. Sojane, J. S., Klopper, H. C., & Coetzee, S. K. (2016). Leadership, job satisfaction and intention to leave among registered nurses in the North West and Free State provinces of South Africa. *Curationis*, 39(1), 1-10.
 22. Khadria, B. (2007). International nurse recruitment in India. *Health Services Research*, 42(3p2), 1429-1436.
 23. Lake, E. T. (2002). Development of the practice environment scale of the nursing work index. *Research in nursing & health*, 25(3), 176-188.
 24. Kieft, R. A., de Brouwer, B. B., Francke, A. L., & Delnoij, D. M. (2014). How nurses and their work environment affect patient experiences of the quality of care: a qualitative study. *BMC health services research*, 14(1), 1-10.
 25. Kelly, D., Kutney-Lee, A., Lake, E. T., & Aiken, L. H. (2013). The critical care work environment and nurse-reported health care-associated infections. *American Journal of Critical Care*, 22(6), 482-488.
 26. Almuhsen, F., Alkorashy, H., Baddar, F., & Qasim, A. (2017). Work environment characteristics as perceived by nurses in Saudi Arabia. *International Journal of Advanced Nursing Studies*, 6(1), 45-55.
 27. Kalisch, B. J., & Lee, K. H. (2011). Nurse staffing levels and teamwork: A cross sectional study of patient care units in acute care hospitals. *Journal of nursing scholarship*, 43(1), 82-88.
 28. Danish, R. Q., Ramzan, S., & Ahmad, F. (2013). Effect of perceived organizational support and work environment on organizational commitment; mediating role of self-monitoring. *Advances in Economics and Business*, 1(4), 312-317.
 29. Rabaan, A. A., Al-Ahmed, S. H., Bazzi, A. M., & Al-Tawfiq, J. A. (2017). Dynamics of scientific publications on the MERS-CoV outbreaks in Saudi Arabia. *Journal of infection and public health*, 10(6), 702-710.
 30. Al-Dossary, R. N., Kitsantas, P., & Maddox, P. J. (2016). Clinical decision-making among new graduate nurses attending residency programs in Saudi Arabia. *Applied Nursing Research*, 29, 25-30.
 31. Alsahafi, A. J., & Cheng, A. C. (2016). Knowledge, attitudes and behaviours of healthcare workers in the Kingdom of Saudi Arabia to MERS coronavirus and other emerging infectious diseases. *International journal of environmental research and public health*, 13(12), 1214.
 32. Kim, Y. (2018). Nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus in South Korea. *American journal of infection control*, 46(7), 781-787.
 33. Taghir, M. H., Borazjani, R., & Shiraly, R. (2020). COVID-19 and Iranian medical students; a survey on their related-knowledge, preventive behaviors and risk perception. *Archives of Iranian medicine*, 23(4), 249-254.