

# Critical Care Nurses and Fatigue Perception associated with COVID-19 Working Hours

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**Abstract:** COVID-19 pandemic is creating unprecedented and uncharted demands on critical care units to meet patient needs. Nurses play a pivotal role in delivering effective, flexible, and safe care which makes them are highly vulnerable to fatigue. The main objective of the paper is to determine critical care nurse's perception of fatigue associated with COVID-19 working hours. A descriptive research design was used in this study. A convenience sample of 150 nurses was involved in the current study. Three tools were used in this study for data collection namely nurse-related data assessment; critical care nurses fatigue perception; and job satisfaction tool. The current study findings show that majority were aged between 20 to less than 30 years old, and were males. The majority of studied nurse's perception of the fatigue level was mild. In contrast, at the end of the shift was severe. Also, it was found that the total mean percentage of the physical and environmental fatigue-related risk factors were  $81.6 \pm 9.5$ , and  $52.6 \pm 7.1$  respectively for nurses who perceived severe fatigue. It was recommended that nurses should perform a self-assessment and report if unable to start and during a work shift to provide safe provision of care. Communicate nurse manager about the impacts of shift patterns, and limit overtime working hours.

**Keywords:** Critical Care Nurses; Covid-19; Fatigue; Perception; Level of Fatigue; Job Satisfaction.

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## I. INTRODUCTION

COVID- 19 pandemic caused an increasing need for hospitalization rate due to the associated respiratory complications. Intensive care units in hospitals around the world are used to treat COVID- 19 patients who experienced potentially life-threatening symptoms (Alharbi et al., 2020; Haruna et al., 2021). Pandemic fatigue is defined as distress as a reaction to sustained and unresolved adversity which may lead to complacency, alienation, and hopelessness, emerging gradually over time and affected by emotions, experiences, and perceptions (World Health Organization, 2020).

Nurses in the frontline of the battle against COVID-19 are highly vulnerable to fatigue (Labrague & de Los Santos, 2021). Critical care nurses working in environments, such as intensive care units, there is no escaping the daily monitoring and care for these patients to predict associated outcomes (Alharbi et al., 2020). Lack of adequate personal protection; staff shortages; shortages of beds and mechanical ventilators act as a pressure on staff. Despite these challenges, nurses who work in critical and intensive care units deliver the care required and recent media reports were witnessed for their courage (Åkerstedt et al., 2019; Alharbi et al., 2020).

Critical care nurses may be particularly affected by severe emotional distress which has been associated with the development of fatigue (Alharbi et al., 2020; Wu et al., 2020). Fatigue is a subjective sense of discomfort. In the clinical field, fatigue is defined as a sustaining and intense feeling of burnout and powerlessness when engaged in physical or mental activities, and it cannot be relieved in the short term (Wu et al., 2020). Nurse fatigue is common; current studies have reported moderate-to-high levels of acute fatigue and low-to-moderate levels of chronic fatigue among nurses who work 12-hour shifts (Sagherian et al., 2017).

Factors contributing to the fatigue experienced by nurses include lifestyle, psychological status, work organization, and sleep problems (Çelik et al., 2017). Also, shift work disorder, demographic and other individual lifestyle factors of each nurse, workplace responsibility and workload, workplace culture, and leadership practices. Environmental factors are

explained in the background and significance (Gambill, 2021). Fatigue has safety consequences for nurses' practice that should be monitored by nursing management. Fatigue can threaten safe practice and result in unfavorable patient outcomes (Sagherian et al., 2017; Savitsky et al., 2020)

Fatigue is a biological symptom; it can be physical fatigue which affects the musculoskeletal system or mental fatigue which affects cognitive functioning causing a sense of weariness and less vigilance. When nurses do not recover sufficiently during non-work time, fatigue accumulates and becomes more permanent or chronic in nature, and put at risk nurses' work performance, patient safety, and care quality (Sagherian et al., 2017).

In terms of quality of nursing service, it has been reported that fatigue of nurses could cause professional burnout sense and lower productivity (Cox, 2019; Wu et al., 2020) fatigue has negatively affected the performance of intensive care nurses. Fatigue in nurses is a major job-related factor, one that directly affects performance, caregiving, and decision making. It can become a significant problem, often resulting in a collapse in relations between the nurse and patients, family, and team members, an increase in the possibility for mistakes in the administration of medicines, and deficiencies in decision making and practices involving the monitoring and observing patients (Çelik et al., 2017; Lucchini et al., 2020).

Physical and mental fatigue among nurses must be given attention as an important issue (Jang et al., 2021). Fatigue can result in compromised patient safety, health implications for nurses, financial consequences for facilities, and contribute to the global nursing shortage as nurses leave unhealthy work environments. This study was therefore conducted to determine the perception of critical care nurses of fatigue in COVID-19 working hours.

## II. MATERIAL AND METHOD

**This study aims** to determine the perception of nurses of fatigue associated with COVID-19 working hours.

**Research question:** What is the perception of nurses of fatigue in COVID-19 working hours?

**Materials: Research design:** A descriptive research design was used in this study.

**Settings:** This study was conducted in the emergency and intensive care units (ICUs) of Alexandria Main University.

**Subjects:** A convenience sample of 150 nurses who were involved in providing direct patient care in the previously mentioned units was included in the current study.

**Tools:** Three tools were used in this study for data collection.

**Tool one: Nurse related data assessment:** This tool was developed by the researcher after reviewing the relevant literature (Ahsberg, 2000; Åhsberg, 1998; Alharbi et al., 2020; Elizabeth, 2000; Gambill, 2021) to assess risk factors associated with fatigue that could affect the critical care nurses. It includes two parts:

**Part I: Personal related data:** This part includes nurses' characteristics involved **demographic data** which includes age, sex, marital status, and income.

**Part II: Job-related data** This part includes educational level, and experience in the ICU. **Health relevant data** which includes recent health complaint, chronic illness, number of working hours' lifestyle behaviors, and body mass index (BMI).

**Tool two: Critical Care Nurses Fatigue Perception:** This part contained **Swedish Occupational Fatigue Inventory (SOFI)** which was adopted from (Elizabeth, 2000) to measure nurses' perceived fatigue intensity manifestation related to work in the critical care units. It consists of five different categories as follows: lack of energy; physical exertion; physical discomfort; lack of motivation; and sleepiness which describes feelings of sleepiness, as sleepy, drowsy, yawning, and falling asleep. **Scoring system:** Nurses' response to each item is measured using 7 points Likert scale ranging from 0 (not at all) to 6 (a very high degree). The total score is the sum of all items ranging from 0 to 120 and the results are classified as low level of fatigue (ranging from 0 to 40), moderate level of fatigue (ranging from 41 to 80), and severe level of fatigue (ranging from 81 to 120).

**Tool three: Job satisfaction:** This part was measured using the "job satisfaction scale" which was adapted from Mallilo (1990) to assess nurses' satisfaction with their work. It includes 15 items that reflect happiness. **Scoring system:** Nurses'

responses for each statement are measured using a 5 point Likert scale ranging from strongly disagree (1) to strongly agree (5). The total score is the sum of all items ranging from 15 to 45 and the results are classified to low job satisfaction level (dissatisfied) (ranging from 15 to 24), moderate job satisfaction level (ranging from 25 to 34), and high job satisfaction level (ranging from 35 to 45).

## METHOD

1. An official letter was directed to the hospital administrative authorities to obtain permission to collect the data from the selected settings.
2. **Nurse-related data assessment** (tool one) was developed by the researcher after reviewing the relevant literature. **Nurse Job satisfaction** (tool three) was adapted from Mallilo (1990) and the “**Swedish Occupational Fatigue Inventory**” (tool two) was adopted from Ahsberg (2000).
3. All tools of the study were translated into Arabic. The reliability of all tools was tested after translations into Arabic using Cronbach’s coefficient alpha and they were acceptable.
4. A pilot study was carried out on 15 critical care nurses (10% of the nurses) who were excluded from the total sample of the study to ascertain the clarity, feasibility, and applicability of the study tools and also to identify obstacles that may be faced during data collection and the necessary modifications were done accordingly.

**Data were collected as follows:** Each critical care nurse was interviewed on an individual basis to assess nurses’ satisfaction with their work and the nurses’ responses were recorded by the researcher using the Nurse Job satisfaction tool. Swedish Occupational Fatigue Inventory tool was used to measure nurses’ perceived fatigue intensity manifestation related to work in the critical care units

### Statistical analysis of the data:

The raw data were coded and transformed into coding sheets and the results were checked. Then, the data were entered into SPSS system files (SPSS package version 22) using a personal computer. Output drafts were checked against the revised coded data. Analysis and interpretation of data were conducted.

### The following statistical measures were used:

Descriptive statistics was used- Kolmogorov – Smirnov test was used to examine the normality of data Distribution- Univariate analyses including t-test and ANOVA test were used to test the significance of results of quantitative variables. Linear correlation was conducted to show the relationship between the moral distress scale score and the studied variables. The significance of the results was at the 5% level of significance.

### Ethical considerations:

Nurses' informed consent was obtained before data collection after an explanation of the aim of the study.

Nurses' anonymity and confidentiality of the data were ascertained, and voluntary participation and the right to refuse participation in the study were emphasized to the subjects.

## III. RESULTS

**Table I** presented the distribution of the studied nurses according to their characteristics. About **the demographic data**, it was found that 76.3 were between 20 to less than 30 years old, the majority of them (81.7.0%) were males, and more than half of them (57.3 %) were unmarried. Furthermore, 65.3% of the nurses had a bachelor's degree in nursing, and 47.3 of them reported that they had adequate monthly income. Regarding the **job-related data**, it can be noticed that 37% had nursing experience less than one year. About **the health-related data**, 60% of the studied nurses reported that several working hours were more than 12 hours, and 93.3% didn't suffer from chronic illness.

**Table II** demonstrated the distribution of the studied nurses according to their perception of the fatigue level using the SOFI scale at the beginning and the end of the working shift. It was found that the majority of the studied nurses (92.7%) perceived fatigue level at the beginning of the shift as mild, while none of them perceived it as severe. On the other hand, more than two-thirds of the studied nurses (68.0%) perceived fatigue level as severe at the end of the shift. It was observed that there are statistically significant differences between the beginning and the end of the shift regarding the level of fatigue.

**Table III** indicated the ranking of the fatigue-related risk factors concerning the fatigue level according to the SOFI scale as perceived by the studied nurses. It can be seen that the highest risk factors odds ratio was contact with a patient and wear PPE; long shift > 12 hours, followed by fear of pandemic infection to their family, monthly, social status; nursing procedure; and then the Extra work and isolation areas and working schedule. While the lowest risk factors odds ratio was sleeping hours/day.

**Table IV** revealed the relationship between the fatigue-related risk factors and the perception of the studied nurses' fatigue level using the SOFI scale at the end of the working shift. It was found that the total mean percentage of the physical and environmental fatigue-related risk factors were 81.6±9.5, and 52.6±7.1 respectively for nurses who perceived severe fatigue. Moreover, the total mean percentage of job satisfaction fatigue-related risk factors was 45.1±27.8 for nurses who perceived severe fatigue, and the total mean percentage of psychological stress factors was 52.6±7.1 for nurses who perceived severe fatigue. It can be seen statistically significant differences between the three different fatigue severity levels regarding physical; environmental and psychological stress factors.

**Table I: Distribution of the studied nurses according to their characteristics.**

Nurses characteristics		Studied nurses (n=150)	
		No.	%
Age(years)	20 -<30	115	76.3
	30 -<40	34	22.7
	≥ 40	1	0.7
Gender	Female	29	19.3
	Male	121	80.7
Social status	Married	57	38.0
	Single	86	57.3
	Divorced	3	2.0
	Widow	4	2.7
Educational level	Diploma degree	37	24.7
	Technical institute degree	15	10.0
Monthly income	Bachelor degree	98	65.3
	Adequate	71	47.3
	Just adequate	53	35.3
Experience (years)	Inadequate	26	17.3
	> 1	47	31.3
	1 -< 5	35	23.3
Number of working hours	5-<10	56	37.3
	1 <0	12	8.0
	6 hours	15	10.0
	8 hours	43	28.7
Chronic illness	12 hours	2	1.3
	>12 hours	90	60.0
Chronic illness	Present	10	6.7
	Absent	140	93.3

**Table II: Distribution of the studied nurses according to their perception of the fatigue level using the SOFI scale at the beginning and the end of the working shift.**

	Fatigue level (n=150)						Significance
	Mild		Moderate		Severe		
	No.	%	No.	%	No.	%	
At beginning of shift	139	92.7	11	7.3	0	0.0	MH=9.791 P<0.0001*
At the end of shift	31	20.7	17	11.3	102	68.0	

MH: Marginal Homogeneity test <sup>Mc</sup>X<sup>2</sup>: Mac Nemar test \*significant at P<0.05

**Table III: Distribution of the Level of the risk factors fatigue according to SOFI scale as perceived by the studied nurses.**

	Fatigue related risk factors	Exp (B) Odds ratio	Significance
1	Contact with patient and wear PPE	24.922	0.0001
2	Long shift > 12 hours	18.722	0.0001
3	Fear of pandemic infection to their family	16.934	0.0001
4	Social status	12.628	0.0001
5	Nursing procedure	12.562	0.0001
6	Extra work and isolation areas	10.582	0.001
7	Work schedule	9.945	0.002
8	Monthly income	6.920	0.009
9	Home responsibility	6.831	0.009
10	Age	6.617	0.010
11	Experience years	5.954	0.015
12	Sleeping hours/day	3.542	0.060

Exp(B): logistic binary regression test  $P \leq 0.05$

**Table IV: The relationship between fatigue-related risk factors and the perception of the studied nurses' fatigue level using the SOFI scale at the end of the working shift.**

fatigue-related risk factors	SOFI Score			Significance
	Mild (n=31)	Moderate (n=17)	Severe (n=102)	
Physical factors	76.5±25.8	79.8±9.0	81.6±9.5	F=0.899 P=0.049*
Environmental factors	58.9±7.9	51.2±10.6	52.6±7.1	F=7.409 P=0.001*
Job satisfaction factors	47.6±19.0	51.1±26.2	45.1±27.8	F=0.547 P=0.58
Psychological stress factors	58.9±7.9	51.2±10.6	52.6±7.1	F=7.409 P=0.001*

F: ANOVA test \*significant at  $P \leq 0.05$

#### IV. DISCUSSION

Nurses are the largest group of healthcare workers on the front line of efforts to control the COVID-19 pandemic (Chau et al., 2021). The dramatic Covid-19 pandemic changes in society as well as a nursing working environment which affect by factors such as change with aging, fear of infection to self and family member, long working hours with intensive care provided to patients (Elizabeth, 2020).

The current study showed that there is significance between the level of fatigue at the beginning and end of the shift. This can be interpreted due to the administration change of working hours of nurses shift change. They can have spent ICU more than 12 hours to prevent the spread of infection from them to their family and community. This is supported by Gao, et al (2020) & Hobbs (2018) who reported that in nursing, shift work traditionally, is divided into three 8-hr shifts per day. However, due to the shortage of nurses in isolation units during the COVID-19 pandemic, a pattern of 8- to 12-hr shifts per day has been adopted. A study showed that nurses working shifts of  $\geq 12$  hrs. and those working overtime report lower nursing quality and patient safety. In addition, working longer shifts exposed nurses to a higher risk of mental or physical fatigue, increased levels of stress and decreased job performance and care quality (Jarrar et al., 2019).

The present findings indicated that experience of fatigue affected by gender; experience nurses working; age; absence of previous illness history and experienced together may experience fewer fatigue levels. It is supported by Jarrar et al (2019) who reported that mature and experienced nurses working together with younger and/or less experienced nurses could lower fatigue levels, ensure safer practice and ultimately improve nurse well-being. the studied nurses may experience a severe level of fatigue at the end of the shift as they reported working for more than 12 hours.

Also, the fatigue-related factors that are associated with an increased level of fatigue can be the contact with a covid-19 patient and wear PPE; long shift > 12 hours; fear of pandemic infection to their family; social status; nursing procedures; and extra work and isolation areas; and home responsibility. These results may be supported by Çelik (2017) who reported that there is a significant positive correlation was found between the level of fatigue and the levels of anxiety and depression that would suggest that a fall in resistance to the existing physical, mental, and emotional stress in nurses might lead to anxiety, depression and ultimately fatigue. It can struggle that persistent fatigue is not just a nurse's problem but also a matter that directly affects patient safety and the quality of care.

## V. CONCLUSION

The critical care nurses should perform a self-assessment and report if unable to start and during a work shift to provide safe provision of care. Communicate nurse manager about the impacts of shift patterns, and limit overtime working hours. They need to get adequate sleep and understand the consequences of sleep deprivation. On the administrative level, they need to advocate for safe work environments with appropriate staffing protection that minimizes fatigue. Further research to determine the effect of nurses' fatigue on patients' outcomes in critical care units in the Covid-19 era. Set practice standards and guidelines applicable to nurses and ensure good quality practice environments in the covid-19 pandemic (Gentry, 2019). The ICU diary may be a useful tool for disclosing critical care nurses feeling and negative emotions when increasing the ICU working hours due to the COVID-19 pandemic. Therefore, the aim of this study to determine critical care nurses and fatigue perception associated with covid-19 working hours.

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