Research Article

Nurse Staffing Factors, Fatigue, and Work-related Stress among Emergency Department Nurses During COVID-19 Pandemic

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Abstract

Aims : This study aimed to examine the relationship between nurse staffing factors, fatigue, and stress among emergency department (ED) nurses during pandemic.

Design : Descriptive, correlation, and cross sectional approach.

Methods : Using cross-sectional design, a total of 113 ED nurses in Indonesia selected by convenience sampling completed the survey on the Fatigue Severity Scale (FSS) and the Expanded Nursing Stress Scale (ENSS). Data analysis included descriptive statistics and bivariate analysis.

Results : Nurse staffing factors were not significantly associated with stress (r = -0.07-0.16, p > 0.05). Fatigue correlated with the domain of death and dying (r = 0.19, p < 0.05), problems relating to supervisors (r = 0.19, p < 0.05), workload (r = 0.26, p < 0.01) and patients/families (r = 0.25, p < 0.01), and overall stress (r = 0.21, p < 0.05).

Conclusions : The more severe fatigue the emergency nurses suffered, the worse stress they experienced. The workload and rotation of nurses during pandemic should be readjusted in accordance with current hospital situation. Identification of basic needs during the pandemic such as ensuring the supply of personal protective equipment (PPE) may help to reduce stress and to maintain the service quality in ED. Organizing counseling programs and support group through online meetings can help nurses to share their difficulties and experiences and to prevent them from feeling isolated.

Keywords:
COVID-19 pandemic, emergency nurses, fatigue, staffing patterns, stress

INTRODUCTION

Mental health in the workplace must be given special attention because it has a significant impact and each year it costs up to 500 billion US dollars. A health survey stated that around 63% of respondents experienced stress at work and disturbed their mental health and behavior (1). In recent years, work-related stress has become a major health related problem especially among nurses (2). The majority of nurses have experienced stress and most of them experienced back pain as the manifestation of physical stress (3).

A study in China revealed that 73.5% of nurses had work-related stress (4). In the Middle East, more than 90% of nurses working at Qazvin hospital in Iran suffered

high levels of stress (5). In a South African study, there were 86% of nurses got stressed due to financial problem, 58% experienced high levels of work stress related to staffing issues, 65% got fatigued related to lack of personal achievement, 66% experienced low job satisfaction related to pay, and 60% reported poor general health because of anxiety and insomnia (6).

Emergency nurses often experience more stressful situations because they treat patients with unpredictable conditions and are required to provide a high standard of care in a fast pace [2,7]. This population was 2 times more likely to suffer from stress than those in regular wards (8). The impact of stress on nurses become more severe, especially when witnessing attacks, violence, death, or while performing resuscitation (9).

Before accepting their destiny to care for COVID-19 patients, they initially experienced mixed feelings, including stress, anxiety, and fear because facing a new threat to their own lives while carrying out their jobs (10). Due to a prolonged state of uncontrolled stress, emergency nurses may suffered from moderate to severe level of burnout (11).

Many conditions may cause nurses' stress at work. One of them is nurse staffing factors which consists of the working pattern on shift hours, week work hours, and week work days (12). In Korea, nurses work between 9 a.m. and 6 p.m. with an average of 9.6 hours a day (13). Meanwhile, nurses in Germany work 38 to 39 hours a week (14). Other study has shown that nurses work on average 37.2 hours per week (15). Almost all hospital nurses around the world experienced changes in their daily activity patterns during the pandemic. Time for sleeping and family was limited as compensation for long working hours within a high risk working environment (16).

A joint research by Harvard/Stanford study in 2016 revealed that each year there are

about 120 deaths that may occur due to workplace stress (1). A leading online news article in the UK reported a nurse hanged herself to end her life in September 2014, due to the stress of working 12 hours a day (17). Similar reason also led to the suicide case of an Indonesian nurse in Papua (18).

Not only stress, fatigue may also appear among nurses who are working in challenging environment both physically and emotionally on a daily basis (19). While fatigue has a major negative contribution significantly in health care, clear guidelines and strategy to combat it or reduce its adverse effects are limited (20). If not early recognized and controlled, it may affect quality of service, including as a threat of patient safety (21).

COVID-19 is a highly contagious and fast-spreading disease worldwide, with confirmed patients increasing daily. In Indonesia, emergency nurses suffered from fatigue due to working overtime, overwhelmed by the large number of patients, and rotating irregularly, particularly in the early days of COVID-19 pandemic. As a result, nurses may experience conditions of excessive stress. Information about factors related to stress among emergency nurses during COVID-19 pandemic in Indonesia is limited. The need to identify the relationship between nurse staffing factors, fatigue, and work-related stress among emergency nurses, thus, is imperative.

METHODS

Study Design

A descriptive correlation with cross-sectional approach was conducted. Data were collected through the 1-month-long survey on July 2020.

Population and Sample

A convenience sample of 113 emergency nurses was recruited from 12 ED of hospitals located in Central Sulawesi Province of Indonesia. The inclusion criteria were at least 3 months of experience

working in ED, providing direct care, working in a 3-shift system, and willing to be participant in the study. Those who were sick, having a leadership position, and on maternity leave, unpaid leave, or annual leave were excluded from the study. A minimum sample size of 108 participants was calculated using the G*Power software version 3.1.9.7 [22, 23], with a power of 0.8, an alpha level of 0.05, and 18 predictors. The effect size 0.218 was obtained from R^2 of a previous study (24).

Research Instrument

Demographic questionnaire included demographic data, health-related factors, and nurse staffing factors questionnaire. Demographic data were age, gender, religion, marital status, education, job status, salary, training, and years of working experience in ED. Health-related factors were BMI, diseases, exercise, smoking status, and caffeine consumption. Nursing staffing factors were shift work hours, week work hours, and week work days.

The Fatigue Severity Scale (FSS) was used to measure fatigue among emergency nurses in this study. This questionnaire consists of 9 statements and 7 choices ranging from 1 (strongly disagree) to 7 (strongly agree). An overall fatigue score is obtained by taking the mean score from all responses (25). A high score indicates worse fatigue. The Cronbach's Alpha of the FSS for this current study was 0.90.

The work-related stress of emergency nurses was measured using Expanded Nursing Stress Scale (ENSS) (26). This questionnaire has been translated and used among Indonesian nurses (27). It is a stress measurement tool specifically for nurse with a total of 57 questions. There are 5 alternative answers: 1 (never stressful), 2 (occasionally stressful), 3 (frequently stressful), 4 (always stressful), and 5 (does not apply). There are 9 subscales, namely death and dying (questions no. 1, 9, 17, 27, 37, 47, 53), conflict with physicians (2, 10, 28, 38, 48), inadequate emotional

preparation (3, 11, 19), problems relating to peers (4, 12, 20, 21, 22, 50), problems relating to supervisors (5, 30, 31, 40, 46, 49, 54), work load (13, 23, 32, 41, 42, 45, 51, 55, 57), uncertainty concerning treatment (6, 14, 18, 24, 29, 33, 36, 39, 43) patients and their families (7, 15, 25, 34, 35, 44, 52, 56), and discrimination (8, 16, 26). In all cases, the fifth alternative answer "does not apply" must be scored as 0. The score for each domain is obtained by accumulating all answers, as well as an overall stress score is achieved from total of 57 responses. A high score denotes more severe stress. The Cronbach's Alpha for each ENSS domain ranged from 0.62 to 0.86, while the overall reliability for ENSS was 0.96.

Data Collection and Analysis

Eligible nurses were listed from the head nurses. The researcher explained the study aim, procedure, and relevant information regarding the questionnaire to potential participants. Contact information of the researcher was also given to participants, if they needed further information. Data were collected through questionnaires within one to four weeks. To maximize the response rate, the researcher contacted the head nurse and asked them to remind the participants regularly.

After collected the questionnaire, all items were checked for missing data. All data were input to and analyzed into IBM SPSS version 17 for Windows (IBM Corp.). Descriptive statistics such as mean, SD, frequency, percentage, min, max were generated to describe all variables. Bivariate analysis (Mann-Whitney, Kruskal-Wallis, Spearman Rank) was performed to identify relationship between variables. An alpha level at 0.05 was applied as the threshold of statistical significance.

Prior to data collection, this study was approved by a research and ethics committee in West Java Province, Indonesia No.240/KEPK-FIK.UNAI/EC/VII/20. Anonymity and confidentiality were assured to all participants. As a proof to join

this study, each participant must sign the informed consent. Participants were allowed to withdraw if they felt uncomfortable at any time.

RESULTS

Characteristics of Participants

A total of 113 participants were enrolled in the current study. Participants' demographic data and health-related factors are shown in Table 1. The mean age of the participants was 30.42 years (SD = 4.66). Most of the participants were female (56.6%), having faith in Islam (66.4%), married (64.6%), holding diploma III of nursing degree (68.1%), working as non government employee (72.6%), having salary from 1-2 million rupiahs (51.3%), and attending emergency-related training such as BLS (53.1%) and BTCLS (61.1%). The mean work experience of participants in ED was 4.96 years (SD = 4.31). The average of participants' BMI was 24.52 kg/m^2 (SD = 3.94). Only 15.9% of the participants had chronic diseases, 42.5% had routine weekly exercise, 13.3% had smoking habit, and 38.9% had consumed caffeine regularly.

Table 1.
Demographic data and health-related characteristics of participants (n = 113)

Variable	Category	n (%) or Mean±SD	Min-Max
Age (in years)		30.42±4.66	22-50
Gender	Female	64 (56.6)	
	Male	49 (43.4)	
Religion	Islam	75 (66.4)	
	Christian	29 (25.7)	
	Others	9 (7.9)	
Marital status	Single/Divorced	40 (35.4)	
	Married	73 (64.6)	
Education	Diploma III	77 (68.1)	
	Diploma IV/Bachelor	7 (6.2)	
	Professional nurse	29 (25.7)	
Employment status	Government	31 (27.4)	
	Non government	82 (72.6)	
Salary (in rupiah)	<1,000,000	20 (17.7)	
	1,000,000-2,000,000	58 (51.3)	
	>2,000,000	35 (31.0)	
BLS training		60 (53.1)	
BTCLS training		69 (61.1)	
Work experience (in years)		4.96±4.31	1-20
BMI (kg/m^2)		24.52±3.94	17-36
Chronic diseases		18 (15.9)	
Exercise		48 (42.5)	
Smoking		15 (13.3)	
Caffeine		44 (38.9)	

Note: BLS = Basic Life Support; BTCLS = Basic Trauma and Cardiovascular Life Support, BMI = Body Mass Index.

Nurse Staffing Factors

Table 2 provides an overview of the nurse staffing factors. The mean working hours in morning shift was 6.49 hours (SD = 0.76), the mean afternoon work hours was 7.27 (SD = 0.69), the mean of night work hours was 10.81 (SD = 1.02), and the mean of week work hours was 37.65 (SD = 9.33), where the majority (58.4%) had working less than or equal to 40 hours. The average of week work days was 4.80 (SD= 0.95). The two most frequent days of working were Monday (72.6%) dan Tuesday (69.9%).

Table 2.
Nurse staffing factors (n = 113)

Variable	n (%) or Mean±SD	Min-Max
Morning work hours	6.49±0.76	6-9
Afternoon work hours	7.27±0.69	6-11
Night work hours	10.81±1.02	6-13
Week work hours	37.65±9.33	11-72
Working ≤40 hours	66 (58.4)	
Days of week worked	4.80±0.95	2-7
Sunday	62 (54.9)	
Monday	82 (72.6)	
Tuesday	79 (69.9)	
Wednesday	68 (60.2)	
Thursday	65 (57.5)	
Friday	70 (61.9)	
Saturday	68 (60.2)	

Self-Rated Fatigue among Participants

Table 3 describes the mean scores for each question related to fatigue. The global fatigue scores of the 113 participants ranged from 9 to 62, with a mean score of 30.72 (SD = 12.46). The statement of "fatigue interferes with my physical functioning" (no. 4) had the highest score among items of FSS with a mean of 4.03 (SD = 1.90). The lowest score was found in statement of "I am easily fatigued" (no. 3) with a mean of 2.68 (SD = 1.54).

Table 3.
Global fatigue and items score (n = 113)

No.	Statement	Mean±SD	Possible Range	Actual Range
*	Fatigue score	30.72±12.46	9-63	9-62
1.	My motivation is lower when I am fatigued	3.83±1.89	1-7	1-7
2.	Exercise brings on my fatigue	3.69±1.96	1-7	1-7
3.	I am easily fatigued	2.68±1.54	1-7	1-7
4.	Fatigue interferes with my physical functioning	4.03±1.90	1-7	1-7
5.	Fatigue causes frequent problems for me	3.15±1.86	1-7	1-7
6.	My fatigue prevents sustained physical functioning	3.36±1.88	1-7	1-7

No.	Statement	Mean±SD	Possible Range	Actual Range
7.	Fatigue interferes with carrying out certain duties and responsibilities	3.40±1.99	1-7	1-7
8.	Fatigue is among my most disabling symptoms	3.48±1.97	1-7	1-7
9.	Fatigue interferes with my work, family, or social life	3.10±1.86	1-7	1-7

Stress

The overall and domains of stress scores are summarized in Table 4. Each stress domain has a different possible range of score. The mean stress score of participants was 79.61 (SD = 33.29), ranged from 4 to 165. The domain of death and dying had a mean of 10.51 (SD = 4.30), the conflict with physicians domain had a mean of 5.77 (SD = 3.20), the inadaquate emotional preparation domain had a mean of 4.22 (SD = 2.03), the problems relating to peers domain had the mean of 7.42 (SD = 4.18), the problems relating to supervisors domain had a mean of 9.34 (SD = 5.43), the work load domain had a mean of 14.01 (SD = 6.41), the uncertanty concerning treatment domain had a mean score of 13.49 (SD = 6.06), the patients/families domain had a mean score of 13.54 (SD = 6.01), and lastly, the domain of discrimination reached a mean score of 1.88 (SD = 2.55). Of the 57 questions related to stress in this study, the highest score was found regarding "exposure to occupational safety and health risks" (no. 36) with a mean of 2.21 (SD = 1.11). In this question, 11.5% participants reported that it was not applicable for them and 4.4% reported never stressed, while the rest experienced occasional to very stressed.

Table 4
Overall stress and its domains score (n = 113)

No.	Domain	Mean±SD	Possible Range	Actual Range
*	Stress score	79.61±33.29	0-228	4-165
1.	Death and dying	10.51±4.30	0-28	0-23
2.	Conflict with physicians	5.77±3.20	0-20	0-14
3.	Inadequate emotional preparation	4.22±2.03	0-12	0-10
4.	Problems relating to peers	7.42±4.18	0-24	0-20
5.	Problems relating to supervisors	9.34±5.43	0-28	0-24
6.	Work load	14.01±6.41	0-36	0-31
7.	Uncertainty concerning treatment	13.49±6.06	0-36	0-30
8.	Patients and their families	13.54±6.01	0-32	0-32
9.	Discrimination	1.88±2.55	0-12	0-9

The correlation between demographic data, health-related factors, and stress

The relationship between demographic data, health-related factors, and stress are shown in Table 5. Result showed that majority of demographic factors and health-related factors were not associated with stress and all its domains. Only gender had relationship with the domain of discrimination ($p<0.05$), where men had a higher mean stress score than women (79.92 [SD = 36.91] vs 79.38 [SD = 30.52].

Table 5.
Relationship between demographic data, health-related factors, and stress (n = 113)

Variable	Stress Domains									Stress Score
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	
	Mean±SD									
Gender										
Female	10.69±4.21	5.38±2.81	4.23±2.01	7.11±3.86	9.34±5.47	14.09±6.48	13.86±5.51	13.84±6.01	1.44±2.33	79.38±30.52
Male	10.29±4.45	6.29±3.61	4.20±2.09	7.84±4.58	9.33±5.44	13.90±6.39	13.00±6.73	13.14±6.05	2.47±2.73	79.92±36.91
p-value	0.86	0.19	0.89	0.33	0.90	0.99	0.62	0.65	**0.02***	0.86
Religion										
Islam	10.31±4.32	5.63±3.27	4.17±2.20	7.51±4.55	9.01±5.56	13.65±6.81	12.99±6.20	13.07±6.12	1.77±2.29	77.45±34.37
Christian	10.86±4.22	6.17±2.95	4.24±1.72	7.62±3.47	9.97±5.28	14.59±5.66	14.76±5.74	14.62±6.03	2.14±2.92	84.24±30.92
Others	11.11±4.80	5.77±3.20	4.56±1.66	6.11±3.01	10.00±5.17	15.11±5.51	13.56±5.89	14.00±5.05	2.00±3.50	82.67±33.32
p-value	0.56	0.71	0.89	0.55	0.59	0.64	0.19	0.46	0.82	0.58
Marital status										
Single/divorced	9.63±4.36	5.18±3.24	3.85±2.16	7.60±4.33	8.68±5.54	12.55±7.33	12.80±6.77	12.48±6.91	1.68±2.30	73.98±36.66
Married	11.00±4.22	6.10±3.15	4.41±1.95	7.33±4.13	9.70±5.38	14.81±5.74	13.86±5.64	14.12±5.42	2.00±2.69	82.70±31.12
p-value	0.18	0.13	0.73	0.80	0.42	0.12	0.42	0.15	0.71	0.23
Education										
Diploma III	10.13±3.98	5.77±3.06	4.10±1.95	7.14±4.07	9.08±5.19	13.44±5.87	12.79±5.69	13.38±5.82	1.79±2.52	76.99±31.19
Diploma IV/Bachelor	10.14±3.07	4.86±4.10	3.29±2.13	5.43±2.87	7.29±5.18	12.14±4.84	12.00±5.42	13.43±4.19	3.14±3.07	71.00±29.41
Professional nurse	11.62±5.22	6.00±3.42	4.76±2.16	8.66±4.53	10.52±6.04	15.97±7.76	25.69±6.76	14.00±6.98	1.83±2.53	88.66±38.29
p-value	0.30	0.74	0.20	0.16	0.30	0.14	0.18	0.94	0.38	0.29
Government	9.77±4.19	5.55±3.22	4.13±2.04	7.48±4.45	9.19±5.19	13.06±5.39	12.87±5.70	13.13±5.19	1.42±2.11	76.03±31.80
Non government	10.79±4.34	5.85±3.20	4.26±2.04	7.40±4.11	9.39±5.55	14.37±6.76	13.72±6.20	13.70±6.32	2.06±2.69	80.96±33.92
p-value	0.23	0.57	0.99	0.83	0.95	0.26	0.67	0.73	0.30	0.41
Salary										
<1,000,000	10.25±3.29	5.50±3.03	4.10±1.94	7.65±3.78	9.90±5.40	13.75±5.02	12.15±4.76	13.85±5.32	2.25±2.65	78.85±27.48
1,000,000-1,900,000	10.52±4.81	5.88±3.30	4.09±2.13	7.00±4.35	9.03±5.88	14.09±7.51	13.24±6.75	13.02±6.95	2.05±2.80	78.47±37.70
> 2,000,000	10.66±4.01	5.77±3.20	4.51±1.94	8.00±4.18	9.51±4.74	14.03±5.17	14.49±5.46	14.32±4.61	1.40±2.01	81.94±28.93
p-value	0.99	0.91	0.53	0.38	0.70	0.96	0.27	0.62	0.58	0.91
BLS training										
No	10.43±4.44	5.85±3.42	4.60±1.94	7.96±4.40	8.87±5.79	13.62±6.76	13.51±6.88	13.26±6.40	1.87±2.63	79.42±36.10
Yes	10.58±4.22	5.70±3.02	3.88±2.07	6.95±3.96	9.75±5.11	14.35±6.13	13.47±5.29	13.78±5.69	1.90±2.50	79.78±30.90
p-value	0.55	0.87	0.07	0.24	0.43	0.52	0.86	0.65	0.89	0.87

Variable	Stress Domains									Stress Score
	1	2	3	4	5	6	7	8	9	
	Mean±SD									
BTCLS training										
No	9.89±3.93	5.41±3.16	4.14±1.86	6.70±3.65	8.20±5.17	13.61±5.77	12.66±5.14	12.61±5.14	1.45±2.39	74.20±30.42
Yes	10.91±4.52	6.00±3.22	4.28±2.15	7.88±4.50	10.06±5.51	14.26±6.82	14.13±6.47	14.13±6.47	2.16±2.63	83.06±34.77
p-value	0.26	0.30	0.60	0.14	0.07	0.50	0.29	0.19	0.15	0.12
Chronic Diseases										
No	10.52±4.20	5.78±3.25	4.24±2.08	7.38±4.15	9.02±5.00	13.86±6.20	13.66±5.93	13.36±5.80	1.88±2.61	79.17±32.76
Yes	10.50±4.92	5.72±2.98	4.11±1.84	7.67±4.4.48	11.00±7.25	14.78±7.58	12.56	14.50±7.14	1.89±2.27	81.94±36.88
p-value	0.62	0.99	0.84	1.00	0.21	0.94	0.28	0.44	0.69	0.86
Exercise										
No	11.02±4.31	5.85±3.23	4.42±2.10	7.60±4.53	10.02±5.67	14.48±6.69	14.32±5.78	14.42±6.21	1.86±2.53	83.42±33.92
Yes	9.83±4.24	5.67±3.18	3.96±1.93	7.19±3.70	8.42±5.01	13.38±6.03	12.35±5.57	12.35±5.57	1.92±2.60	74.46±32.04
p-value	0.17	0.79	0.23	0.81	0.61	0.49	0.14	0.08	0.82	0.25
Smoking										
No	10.53±4.01	5.64±3.09	4.18±1.95	7.26±3.96	9.29±5.38	13.97±6.19	13.40±5.82	13.58±5.77	1.80±2.57	79.10±31.52
Yes	10.40±6.05	6.60±3.86	4.47±2.61	8.53±5.48	9.67±5.94	14.27±7.95	14.07±7.64	13.27±7.63	79.10±31.52	82.93±44.34
p-value	0.98	0.45	0.64	0.47	0.84	0.97	0.89	0.78	0.17	0.86
Caffeine										
No	10.35±4.05	5.67±3.10	4.19±1.91	7.26±4.23	9.33±5.72	13.71±6.65	13.68±5.97	13.26±5.89	1.84±2.65	78.77±33.70
Yes	10.77±4.71	5.93±3.37	4.27±2.24	7.68±4.15	9.34±5.02	14.48±6.07	13.18±6.25	13.98±6.23	1.95±2.42	80.93±32.98
p-value	0.78	0.74	0.84	0.58	0.95	0.55	0.39	0.57	0.48	0.99

*Note: *p < 0.05 level (2-tailed); BLS = Basic Life Support; BTCLS = Basic Trauma & Cardiovascular Life Support; 1 = Death and dying; 2 = Conflict with physicians; 3 = Inadequate emotional preparation; 4 = Problems relating to peers; 5 = Problems relating to supervisors; 6 = Work load; 7 = Uncertainty concerning treatment; 8 = Patients/families; 9 = Discrimination.*

Table 6 presents the correlation coefficients between continuous data on demographic data, health-related factors, nurse staffing factors, fatigue, and stress. Result showed age correlated negatively with the domain of inadequate emotional preparation (r = -0.21, $p < 0.05$). Nurse staffing factors were not correlated with stress (r = -0.07-0.16, $p > 0.05$). Fatigue had positive correlation with the domain of death and dying (r = 0.19, $p < 0.05$), problems relating to supervisors domain (r = 0.19, $p < 0.05$), workload domain (r = 0.26, $p < 0.01$) and patients and their families domain (r = 0.25, $p < 0.01$). Ultimately, fatigue also correlated positively with overall stress score (r = 0.21, $p < 0.05$).

Table 6.
Correlation matrix of study variables (n = 113)

	Variable	1	2	3	4	5	6	7	8	9	10
1	Age	1									
2	Work experience	0.02	1								
3	Body mass index	0.14	-0.03	1							
4	Morning work hours	-0.02	0.05	-0.04	1						
5	Afternoon work hours	-0.05	0.01	-0.00	0.64**	1					
6	Night work hours	-0.11	0.01	-0.05	0.08	0.26**	1				
7	Week work hours	0.00	0.06	-0.15	0.21*	0.22*	0.06	1			
8	Days of week worked	0.18	0.12	0.09	0.02	0.01	-0.21*	0.34**	1		
9	Fatigue Score	0.05	-0.13	-0.02	-0.01	0.05	-0.06	0.06	0.07	1	
10	Death and dying	0.03	0.07	0.06	0.16	0.05	-0.05	0.03	0.04	**0.19***	1
11	Conflict with physicians	0.00	0.03	0.06	0.13	0.12	-0.05	-0.03	-0.00	0.18	0.74**
12	Inadequate emotional	**-0.21***	0.09	-0.02	0.05	-0.00	-0.04	-0.02	0.00	0.14	0.54**
13	Problems relating to peers	-0.13	0.06	0.06	0.12	0.05	-0.06	0.00	-0.01	0.02	0.54
14	Problems with supervisors	0.01	0.02	0.02	0.17	0.14	-0.02	0.05	0.02	**0.19***	0.68**
15	Work load	-0.41	0.00	-0.02	0.17	0.04	-0.10	0.02	0.02	**0.26****	0.80**
16	Uncertainty	-0.35	-0.01	0.02	0.77	0.03	-0.10	-0.08	-0.08	0.14	0.68**
17	Patients and their families	0.34	0.07	0.06	0.07	-0.03	-0.09	0.15	0.05	**0.25****	0.74**
18	Discrimination	0.35	0.27	0.06	0.14	0.18	-0.07	0.01	-0.01	0.14	0.36**
19	Stress Score	-0.02	0.04	0.05	0.16	0.07	-0.07	0.01	0.00	**0.21***	0.86**
	Variable	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	
11	Conflict with physicians	1									
12	Inadequate emotional	0.48**	1								
13	Problems relating to peers	0.58**	0.58**	1							
14	Problems with supervisors	0.77**	0.44**	0.62**	1						
15	Work load	0.69**	0.58**	0.53**	0.76**	1					
16	Uncertainty concerning	0.71**	0.60**	0.64**	0.73**	0.75**	1				
17	Patients and their families	0.68**	0.51**	0.52**	0.77**	0.75**	0.66**	1			
18	Discrimination	0.55**	0.17	0.32**	0.43**	0.29**	0.31**	0.30**	1		
19	Stress Score	0.06**	0.62**	0.71*	0.89**	0.88**	0.86**	0.85**	0.46**	1	

Note: *p < 0.05 level; **p < 0.01 level (2-tailed)

DISCUSSION

The findings suggest that fatigue should be taken into account when assesing and managing nurses' work-related stress. Among all the components measuring fatigue, physical functioning was the most aspect affected. From demographic characteristics, only age and gender had significant correlation with stress' domain of inadequate emotional preparation and discrimination. In this study of Indonesian emergency nurses, as fatigue increased, stress become more severe.

The mean number of hours worked during the morning, afternoon, and night shift were 6.49, 7.27, and 10.81 hours, respectively. Compared with a study by Chappel et al. (28), the length of morning and afternoon shifts in this study were shorter, whereas average duration of night duty was relatively longer. More than half of the participants work according to the Laws of the Republic of Indonesia, which is less than or equal to 40 hours a week. This finding is congruent with previous study that found an average of nurses' day of week worked was 38 hours (12). However, Iranian emergency nurses had spent averagely 48.1 hours of service per week (29).

This study yielded a mean of fatigue score of 30.72 from the FSS, indicating that fatigue was prevalent and in moderate level in emergency nurses. In Wuhan, China, a moderate level of fatigue was existed among nurses who were fighting againts COVID-19 in the first-line (20). Similarly, in the US, hospital nurses and nursing assistants had high acute fatigue and moderate-to-high chronic fatigue (30). While, in Indonesia more than 80% of Indonesian health workers including nurses were experiencing physical fatigue during the COVID-19 Outbreak (31).

The overall stress score in this study was 79.61. This finding is much lower than a study among hospital nurses with a score of 136.27 in Greek (32). However, another study in Indonesian nurses found that mean stress score were lower than this study with a score of 31.24 (27). In the current study, the most stressful condition of emergency nurses during COVID-19 pandemic was about occupational safety and health risks. This is in line with the finding who explicitly stated that the requirement to use extra personal protective equipment (PPE) as the most significant stressor (31). This may be caused by discomfort feeling from using PPE and its negative body reactions such as skin reactions, breathing difficulty, feeling dizzy and hot, and nausea (33).

Age was found negatively associated with stress. Young nurses were speculated to have higher stress related to out-of-hospital activities, such as working on weekends (12). Younger and inexperienced nurses have a tendency to show more psychiatric symptoms than older nurses. During the transition from being a student to newly qualified nurse, dealing with complex cases with poor clinical experience may increase susceptibility to stress (34).

Gender was associated with the stress domain of discrimination, where male nurses were more stressed than their female counterparts. Literature review revealed that gender discrimination is still exist within nursing world (35). A study in Jamaica highlighted that patients had a negative attitude towards male nurses, but there was a significant positive view if they received care from male nurses (36). Nursing must be normalized as a career for men and to guarantee that men are treated equally, rather than as "male nurses" (37).

There was no significant relationship between the working hours in a week, the working days in a week, working hours in a shift, and work-related stress. This is consistent with a study who aimed to explore the relationship between nurse staffing factors and stress in hospital setting (12). On the contrary, another study found that hours working in a week was a significant determinant of nurses' work-related stress (38). A study in Japan verified that the pressures of working overtime and

long working hours can contribute to work-life imbalance, which reduces quality of life and job satisfaction of hospital nurses (39).

Fatigue was significantly correlated to overall stress. The correlation is positive or unidirectional. This is in line with a study in East Java of Indonesia who conducted their study with a relatively small sample size (40). Nurses in the risk groups of perceived stress experienced greater physical and mental fatigue (20). Both fatigue and stress were predictors of insomnia among Chinese front-line nurses fighting against COVID-19 in Wuhan (41). Nurses who experiencing fatigue tend to be very sensitive to various things due to a decrease in body condition and perceived excessive burden (42). Some factors influenced on nurses' performance during COVID-19 pandemic. Two important factors nurses repeatedly reported are both fatigue and stress. There is strong scientific evidence connecting fatigue and nurses' bad performance, making it a known risk factor in improving patient safety (16).

This study has some limitations. The use of cross-sectional approach and non probability sampling restricted to generalize the study findings, since it only emphasize correlation rather than cause and effect relationship. The current study was only conducted in a province, the findings may not depicted the situation of emergency nurses who were working in other areas of Indonesia. This study can be strengthened by expanding to include other hospitals in other provinces.

CONCLUSION

The importance of assessing for fatigue and stress is highlighted based on the findings about the prevalence of these variables among study participants. The more severe fatigue the emergency nurses suffered, the worse stress they experienced. Although, nurse staffing factors were not associated with stress, it would be worth readjusting the workload and rotation of emergency nurses during pandemic in accordance with current hospital situation. Early

identification of basic needs for working during the pandemic, such as ensuring the supply of PPE may help to maintain their quality of services in ED. Effective interventions for reducing stress should be designed based on nurses' psychological states, for example, organizing counseling programs for nurses who are with worsening symptoms of stress. Developing a support group through online meetings can offer chances for nurses to share their difficulties and experiences and to prevent them feeling isolated from others.

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