Evaluating the Stress Factors of Dermatology Nurses during the COVID-19 pandemic in Vietnam

Research Article

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Abstract

Objectives: Nursing is among the top three most stressful jobs, yet stress in nurses has diminishing impacts on their personal health and productivity. The COVID-19 pandemic might elevate stress in nurses, in particular dermatology nurses. This study aims to examine the prevalence of stress among dermatology nurses and its related factors. Methodology: A cross-section study was conducted among 154 nurses at the National Hospital of Dermatology and Venereology in Vietnam. Data were collected during the third cluster of COVID-19 pandemic spread in Hanoi. Nurse stress was measured by stress items of the DASS-21. Factors related to stress included personal, family, work-related and social factors. Results: 51.9% of nurses met the criteria for stress according to DASS-21. All nurses reported at least 1 symptom of stress in the past week. Factors significantly related to stress among nurses included personal, family, work-related and social factors. While many factors in these four groups created stress in nurses, only work-related and social factors elevated the severity of stress in nurses. Conclusion: Hospital management should develop strategies to support nurses deal with stress, since most of the factors that elevate stress can be addressed by system-level interventions, such as management of professional relationships, organizational justice, and the welfare system.

Key Words: COVID-19 pandemic, DASS-21, Dermatology, Hospital management, Nurses, Stress factor.

Introduction

Nursing is among the top three most stressful jobs due to its high workload and interpersonal relationship strains (1). Thirty to forty-three percent of nurses' experience stress, depending on measurements (2). In Vietnam, the rate of stress in nurses varies from 18.5% to 46% (3-5). In the context of the Covid-19 pandemic, the severity of work-related stress in nurses increases even more. Recent studies found that nurses reported COVID-19 related symptoms of acute stress disorder (60) and post-traumatic stress disorder (7-9).

Work setting were reported to affect stress level in nurses. Nurses in intensive care units (ICU) and nurses taking care of cancer patients are likely to experience higher stress. [2] While having a less challenging job than nurses in ICU centers, dermatology nurses also have a demanding job, especially nurses in the big public hospital, as they serve hundreds of patients a day. In the context of

COVID-19, dermatology nurses might encounter more stress for two reasons. Firstly, as their job requires direct contact with patients, the risk of COVID-19 infection is heightened. Secondly, COVID-19 prevention measures also mean a higher workload, more paper work, and more prevention interventions required.

Stress in nurses has negative impacts on their personal health. Stress creates job burnout and dissatisfaction among nurses (1). Stress also reduces productivity, as a 3-month study found that nurses who suffer stress for a long time were more likely to create patients' incidents such as falls and medication errors (11). As a result, it is important to understand the sources of stress in nurses in order to support nurses to manage stress.

Factors related to stress in nurses

Previous studies have found that various factors influence occupational stress in nurses, including personal factors, work-related factors, health-related factors, etc. Lazarus' definition of stress provides a useful framework to classify these associated factors. According to Lazarus and Folkman (12), work stress is the response to situations when demands and pressures do not match abilities and knowledge, thus challenging

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people's ability to cope. If stress results from a mismatch between work pressure and personal capability, we can look at the predictors of stress as factors creating work pressure and factors affecting personal capability. These factors are presented in figure 1 (see Figure 1).

Personal and family factors are factors affecting personal capability to deal with occupational stress. A nurse who has a higher educational background, more training and working experiences, good healthcare habits, and supporting family will have more resources to deal with stress (13-16).

Work-related factors and social factors are factors creating work pressure. A demanding job is a job with a high workload, high risk of infection or injury, work instability, and role ambiguity (17-19). Relationships with coworkers and patients also contribute to creating work stress in nurses (20-21).

Based on the classification of predictors of occupational stress, it is expected that personal and family factors are stress buffers and work-related and social factors are stress creators.

Figure 1. Research model of stress in nurses
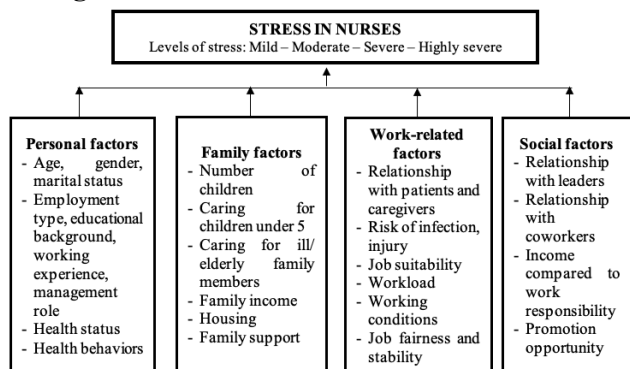
While many studies have examined the influences of these factors on stress in nurses, few studies have tested all these factors together. This study is among the first to examine diverse factors associated with stress in dermatology nurses in the context of COVID-19. By examining the prevalence of stress among dermatology nurses and its related factors, this study contributes to the literature on stress in nurses. Moreover, findings from this study will provide suggestions for strategies and policies to reduce occupational stress in nurses in the context of the COVID-19 pandemic.

Methods

Study design and participants

This is a cross-section study which was conducted during the third cluster of COVID-19 pandemic spread in Hanoi, Vietnam from August 2020 to September 2020.

The research was conducted at the National Hospital of Dermatology and Venereology, the leading dermatology hospital in Hanoi, Vietnam. The participants were all nurses at the National Hospital of Dermatology and Venereology in Vietnam, in which

making the sample size of 154 nurses. The researchers contacted nurses to schedule a session after their work shifts. During the scheduled session, nurses filled in the informed consent form and completed the self-report questionnaire.

Variables

The dependent variable in this study is work-related stress. The independent variables include individual characteristics (age, gender, marital status, educational background, work experience, management role), health behaviors (smoking, drinking, sports), health status (chronic disease, perceived health status), family-related factors (number of children, caretaking of children aged under 5 years old, caretaking of sick/old family members, family income, family support, house ownership), work-related factors (relationship with patients, relationship with patients' caregivers, work risks, workload, perceived suitability to personal abilities, working facilities and environment, fairness, job fairness, and stability), and social factors (relationship with supervisors/leaders, relationship with colleagues, income, opportunity for training, opportunity for promotion).

Instrument

Stress was measured by the Depression, Anxiety, and Stress Scale short version (DASS-21). The DASS-21 measures stress, anxiety, and depression. In this study, we only used 7 items to measuree stress in the DASS-21. Participants rated on a scale of 0 (never) to 3 (almost always). The individual score was multiplied by 2, thus participants' scores ranged from 0 to 42. A score of 10 and above were classified as experiencing stress. In particular, a score of 10-13 is mild stress, 14-20 is moderate stress, 21-27 is severe stress, and 28 and above is extremely severe stress (22).

Data analysis

Both descriptive and analytical statistics were carried out using Stata 14 software (Stata Corporation). Proportions of variables of interest, together with corresponding 95% Confidence Interval (CI), were calculated. Multivariate logistic regression modeling was performed to examine the probability of stress in nurses in relation socio-demographic status of the study respondents. A significance level of $p < 0.05$ was used.

Results

The demographic characteristics of nurses in the study included 80.5% female aged under 40 (84.5%), married (74%), and were raising children (74%). Most nurses had a university degree (51.3%) and above (14.3%). On average, nurses had worked at the hospital for 7.7 years. 82.4% participants had a long-term contract with the hospital and 89.6% did not hold a management position. Most nurses did not smoke and drink alcohol (98.7%, 75.3%, respectively), but 2 nurses (1.3%) reported heavy smoking and 24.7% reported occasional drinking. None of the nurses drank alcohol every day. 33.8% of nurses exercise regularly. About chronic illness, 11.7% reported at least 1 chronic illness.

Most nurses perceived their health status as normal (72.7%) or good (26%).

Stress level of nurses

Table 1. Stress level of nurses (N=154)

Stress level	N	%
No stress	74	48.1
Mild stress	30	19.5
Moderate stress	40	25.9
Severe stress	8	5.2
Extremely severe stress	2	1.3

All 154 participated nurses reported at least one symptom of stress in the past week. The most common symptom was "hard to wind down" (76.6%), "using a lot of nervous energy" (64.9%), over-reaction (62.3%), and difficult to relax (58.4%). DASS scores of nurses ranged from 10 points to 36 points, M=14.75. According to DASS-21 cut-off criteria, 51.9% of nurses had stress, among which 19.5% had mild stress, 25.9% had moderate stress, and 6.5% had severe and extremely severe stress (see Table 1).

Factors associated with the prevalence of stress among nurses

Table 2. Personal factors associated with stress in nurses

Personal factors		Stress		OR (95%CI)	P-value
		No	Yes		
Gender	Male	56	68	0.5 (0.2 – 1.2)	0.14
	Female	18	12		
Age	≤29 (ref.)	30	24	**2.1 (1.1 – 4.4)**	**0.03**
	30-39	28	48		
	40-49	16	6	0.5 (0.2 – 1.4)	0.16
	Above 50	0	2		0.12
Marital status	Married	52	62	0.7 (0.3 – 1.4)	0.3
	Single, separated, widow	22	18		
Educational background	College or vocational	31	22	**1.9 (0.9 – 3.7)**	**0.05**
	University degree and	43	58		
Work experience	< 10 years	46	42	**1.5 (0.8 – 2.8)**	**0.02**
	≥ 10 years	28	38		
Employment type	Short-term contract	12	15	0.8 (0.4 – 1.9)	0.67
	Long-term contract	62	65		
Management position	No	66	72	0.9 (0.3 – 2.6)	0.86
	Yes	8	8		
Smoking	Frequently	0	2		0.17
	Never	74	78		
Drinking	Occasionally	18	20	1.0 (0.5 – 2.0)	0.92
	Never	56	60		
Regular exercises	Yes	38	14	**5.0 (2.4 – 10.4)**	**<0.001**
	No	36	66		
Chronic illness	Yes	10	8	1.4 (0.5 – 3.8)	0.49
	No	64	72		
Perceived general health	Weak	0	2		0.17
	Normal/ Good	74	78		

Table 2 presents personal factors associated with stress in nurses. Among age groups, nurses aged 30 to 39 years old experienced stress twice more than nurses under 29 years old (OR=2.1, 95% CI: 1.1-4.4, p=0.03). Nurses who had a university degree and above were more likely to experience stress than nurses with lower education background (OR = 1.9, 95% CI: 0.9-3.7, p=0.05). Nurses having worked at the hospital for 10 years or more were more likely to experience stress than nurses having worked for less than 10 years (OR=1.5,

95% CI: 0.8-2.8, p=0.02). Gender, marital status, type of contract, and management position were not associated with stress in nurses.

There was no relationship between stress in nurses and smoking, drinking, chronic illness, or perceived general health. Nurses who did not exercise regularly had a higher chance of stress than nurses who exercise regularly (OR=5.0, 95% CI: 2.4-10.4, p<0.001).

Table 3. Family factors associated with stress in nurses

Family factors		Stress		OR (95%CI)	P-value
		No	Yes		
Child raising	No child	26	14	**2.6 (1.2 – 5.4)**	**0.01**
	Have children	48	66		
	Doesn't have children aged under 5	48	36	**2.3 (1.2 – 4.3)**	**0.01**
	Have children aged under 5	26	44		
Caring for ill or elderly family member	No	46	54	0.8 (0.4 – 1.5)	0.48
	Yes	28	26		
Monthly income per capita	≤1.5 million VND	56	66	0.7 (0.3 – 1.4)	0.29
	> 1.5 million VND	18	14		
Own a house	Yes	38	42	1.0 (0.5 – 1.8)	0.89
	No	36	38		
Family support for hospital work	Supported	56	42	**2.8 (1.4 – 5.6)**	**<0.05**
	Not supported	18	38		

The result in Table 3 showed that nurses who had children, especially children aged under 5 years old, were more likely to have stress than nurses who did not have children (OR=2.6, 95% CI: 1.2-5.4, p=0.01) or those having children older than 5 years old (OR=2.3, 95% CI: 1.2-4.3, p=0.01). However, no relationship was found between caring for ill/elderly family members and stress in nurses. Nurses who received family support for their work were less likely to experience stress (OR=2.8, 95% CI: 1.4-5.6, p<0.05). Financial indicators such as monthly income or house owning (an indicator of financial stability in Vietnam) were not related to stress in nurses.

Table 4: Work-related factors associated with stress in nurses

Work-related factors		Stress		OR (95%CI)	P-value
		No	Yes		
Job nature					
Direct patient care	No	4	4	1.1 (0.3 – 4.5)	0.91
	Yes	70	76		
Patient's cooperation during treatment	Good/Very good	46	20	**4.9 (2.5 – 9.8)**	**<0.001**
	Average/Not good	28	60		
Face dangerous behaviors from patients	Never	26	14	**2.6 (1.2 – 5.4)**	**0.01**
	At risk	48	66		
Negative responses from patients' family	Never experienced	28	12	**3.4 (1.6 – 7.5)**	**0.001**
	Have experienced	46	68		
Risk of infection from daily work	Low risk	24	28	0.9 (0.5 – 1.7)	0.74
	High risk	50	52		
Risk of injury by sharp objects in daily work	Low risk	18	18	1.1 (0.5 – 2.3)	0.79
	High risk	56	62		
Workload					
Assigned too many tasks beyond one's ability	Never	58	24	**8.5 (4.1 – 17.6)**	**<0.001**
	Sometimes/Frequently	16	56		
Assigned tasks beyond one's position	Never	70	48	**11.7 (3.9 – 35.1)**	**<0.001**
	Sometimes	4	32		
Clarity in work assignment	Clear	72	72	4.0 (0.8 – 19.5)	0.06
	Unclear	2	8		
Night shift	Never/Few	66	70	1.2 (0.4 – 3.2)	0.74
	≥ 2 times per week	8	10		
Work overtime	Never/Rarely	48	54	0.9 (0.5 – 1.7)	0.73
	Frequently	26	26		
Suitability between current job and personal ability	Suitable	74	72		**<0.05**
	Not suitable	0	8		
Suitability between current job and educational background	Suitable	72	76	1.9 (0.3 – 10.7)	0.46
	Not suitable	2	4		
Working conditions					
Equipment for work	Suitable	72	50	**21.6 (4.9 – 94.5)**	**<0.001**
	Not suitable	2	30		

Protection equipment	Enough	70	74	1.4 (0.4 – 5.2)	0.59
	Not enough	4	6		
Noise level in the office	Quiet	64	44	**5.2 (2.4 – 11.6)**	**<0.001**
	Noisy	10	36		
Temperature in the office	Suitable	74	62		**<0.001**
	Not suitable	0	18		
Lighting condition in the office	Suitable	66	62	**2.4 (1.0 – 5.9)**	0.05
	Not suitable	8	18		
Space in the office	Enough space	68	58	**4.3 (1.6 – 11.3)**	**<0.05**
	Not enough space	6	22		
Fairness and stability at work					
Unfair treatment in the hospital due to personal relationships	Never occur/Rarely	42	26	**2.7 (1.4 – 5.3)**	**<0.05**
	Sometimes/Frequently	32	54		
Fairness in evaluating employee's performance	Fair	70	58	**6.7 (2.2 – 20.4)**	**<0.001**
	Unfair	4	22		
Stability of current job/ position	Stable	70	68	**3.1 (0.9 – 10.0)**	0.05
	Slightly unstable	4	12		

Four types of work-related factors associated with stress in nurses were presented in Table 4, including factors reflecting the nature of the job, workload, working conditions, and a sense of fairness and stability at work.

Among factors about job nature, direct patient care or risks of injury or infection from daily work were not associated with stress in nurses. It was relationships with patients and their families that led to occupational stress in nurses. Low cooperation from patients increased the risk of stress in nurses to nearly 5 times (OR=4.9, 95% CI: 2.5-9.8, p<0.001). In addition, nurses who were at risk of patients' dangerous acts or had experienced negative responses from patients' families were more likely to get stress (OR=2.6, 95% CI: 1.2-5.4, p=0.01) and (OR=3.4, 95% CI: 1.6-7.5, p=0.001), respectively.

Regarding workload, nurses sometimes or frequently being assigned too many tasks beyond their ability were more likely to get stressed than nurses who never faced high workload (OR=8.5, 95% CI: 4.1-17.6, p<0.001). Nurses who were sometimes assigned tasks beyond their position were at risk of stress than nurses who were not (OR=11.7, 95% CI: 3.9-35.1, p<0.001). A mismatch between the current job and personal ability significantly increased the rate of occupational stress in nurses, but a mismatch between the current job and

educational background did not. Role ambiguity and long working hours such as night shift and overtime work were not associated with occupational stress in nurses.

With regard to working conditions, 5 out of 6 factors about working conditions were associated with occupational stress in nurses. Lack of suitable equipment was associated with the highest risk of stress (OR=21.6, 95% CI: 4.9-94.5, p<0.001), followed by noise level (OR=5.2, 95% CI: 2.4-11.6, p<0.001), space in the office: (OR=4.3, 95% CI: 1.6-11.3, p<0.05), lighting condition (OR=2.4, 95% CI: 1.0-5.9, p=0.05), and temperature in the office: 45.6% nurses felt stress when the temperature was suitable as compared to 100% felt stress when temperature was not suitable, p<0.001. Lack of protective equipment during work did not affect stress in nurses (OR=1.4, 95% CI: 0.4-5.2, p=0.59).

Regarding fairness and stability at work, nurses who found the job unfair were more likely to experience occupational stress than nurses who found the job fair (OR=2.7, 95% CI: 1.4-5.3, p<0.05, and OR=6.7, 95% CI: 2.2-20.4, p<0,001). Nurses who perceived their current job or position as slightly unstable were more likely to get stressed (OR=3.1, 95% CI: 0.9-10.0, p=0.05).

Table 5: Social factors associated with stress in nurses

Factors		Stress		OR (95%CI)	P-value
		No	Yes		
Work relationships					
Support from supervisors/ leaders	Frequent	48	48	1.2 (0.6 – 2.4)	0.53
	Not frequent	26	32		
Relationship with supervisors/ leaders	Good/Very good	32	30	1.2 (0.7 – 2.4)	0.47
	Normal	42	50		
Support from colleagues	Frequent	56	58	1.2 (0.6 – 2.4)	0.65
	Not frequent	18	22		
Relationship with colleagues	Good/Very good	50	44	1.7 (0.9 – 3.3)	0.11
	Normal	24	36		

Salary and promotion					
Monthly salary	High/Very high	4	4	1.1 (0.3 – 4.5)	0.91
	Average	70	76		
Suitability between salary and work performance	Suitable	72	74	2.9 (1.6 – 14.9)	0.18
	Not suitable	2	6		
Opportunities for training	Many	66	62	**2.4 (1.0 – 5.9)**	**0.05**
	Few	8	18		
Opportunities for promotion	Many	38	40	1.1 (0.6 – 2.0)	0.87
	Few	36	40		

Table 5 presented social factors associated with stress in nurses. Opportunity for training was the only factor associated with occupational stress: OR=2.4, p=0.05. Relationships with supervisors/leaders or colleagues were not associated with stress. Neither were salary or opportunities for promotion.

Factors associated with the level of stress among nurses

To examine the impacts of personal, family, work-related, and social factors on different levels of occupational stress among nurses, we compared the effects of these factors on 2 groups: (i) mild and moderate stress and (ii) severe and highly severe stress. Table 6 reported factors that had a significant association with the level of stress.

Table 6: Factors associated with severity of stress among nurses

Factors		Stress		OR (95%CI)	P-value
		Mild and moderate	**Severe and highly severe**		
Personal factors					
Gender	Male	62	6	**5.2 (1.2 – 22.3)**	**0.02**
	Female	8	4		
Age	≤29 (ref.)	24	0		0.03
	30-39	40	8		
	40-49	4	2		**<0.05**
	Above 50	2	2		
Educational background	College or vocational degree	22	0		0.03
	University degree and above	48	10		
Work-related factors					
Patient's cooperation during treatment	Good/Very good	20	0		**<0.05**
	Average/Not good	50	10		
Risk of infection from daily work	Low risk	28	0		0.01
	High risk	42	10		
Equipment for work	Suitable	30	0		**<0.05**
	Not suitable	40	10		
Unfair treatment in the hospital due to personal relationships	Never occur/Rarely	20	6	**0.3 (0.1 –1.0)**	0.04
	Sometimes/Frequently	50	4		
Social factors					
Support from supervisors/ leaders	Frequent	46	2	**7.7 (1.5 – 39.0)**	**<0.05**
	Not frequent	24	8		
Relationship with supervisors/ leaders	Good/Very good	30	0		**<0.05**
	Normal	40	10		
Monthly salary	High/Very high	58	4	**7.3 (1.8 – 29.7)**	**<0.05**
	Average	12	6		
Opportunities for promotion	Many	38	2	**4.8 (0.9 – 24.0)**	0.04
	Few	32	8		

As shown in Table 6, family factors did not influence the severity of occupational stress in nurses. Among personal factors, gender, age, and educational background were associated with the severe stress in nurses, but health behaviors or health status were not.

Male nurses were 5.2 times more likely to face severe and highly severe stress than female nurses. Nurses in the 30-39 and 40-49-year-old groups were more likely to have severe stress than nurses under 30 years old. The rate of nurses having severe and highly severe

stress in the 30-39 and 40-49 groups were 16.7% and 33.3%, respectively, p<0.05. Nurses with a university degree and above were more likely to experience severe and high stress, p<0.05, while none of the nurses with college or vocational degrees experienced severe stress.

Regarding work-related factors, uncooperative patients could heighten the rate of severe occupational stress in nurses from 0% (in case of a good relationship with patients) to 16.7% (in case of average/not good relationship with patients). Similarly, risk of infection and lack of equipment was associated with severe and highly severe stress at 19.2% and 20%, respectively. Nurses who perceived to be treated unfairly due to personal relationships were slightly more likely to have severe stress: OR=0.3, p=0.04.

Concerning social factors, relationships with supervisors/leaders worsened stress in nurses, as nurses who did not receive frequent support were 7.7 times more likely to experience severe and highly severe stress, p<0.05, and nurses with an average relationship with supervisors/leaders were 2-% more likely to have severe and highly severe stress as compared to 0% of severe stress in nurses with the good relationship with supervisors/leaders. Nurses with average monthly income and few opportunities for promotion were also more likely to have severe and highly severe stress than nurses with high income or many opportunities for promotion: OR=7.3 and 4.8, respectively.

Discussion

Prevalence of stress among nurses

Among studies using DASS-21, the percentage of nurses experiencing stress as found in this study was 51.9%, higher than the rate reported in some countries in the region, such as Malaysia (23.6%) (23), Hong Kong (41.1%) (24), Pakistan (41.9%) (25). This rate is also higher than the rate reported by previous studies on healthcare workers in Vietnam, which usually ranges from 18.5% to 46% (3-5).

When compared by the severity of stress, nurses with moderate stress account for the highest percentage (25.9%), higher than the mild stress (19.5%), severe (5.2%), and highly severe (1.3%) groups. This pattern is typical of previous studies conducted in Vietnam, most of which found that the mild stress group is more common than the moderate, severe, and highly severe group (26-27). It is notable that all 154 nurses had at least one symptom of stress in the past week. In other words, although 51.9% of nurses in this study were diagnosed with stress, the remaining 48.1% of nurses were not free of stress symptoms. This result raises significant considerations for the Board of directors of the National Dermatology Hospital to come up with solutions to support nurses in mental health and work productivity.

Why is the rate of stress in this study higher than in other studies using the same measurement? Data for this study were collected in August 2020, when the third phase of COVID-19 started to spread again in Hanoi city after 99 days free of infected cases (28). Although nurses at the National Dermatology Hospital were not frontline workers who were directly involved in taking care for COVID-19 patients, they had to heighten preventive measures against the COVID-19 pandemic as requested by the Ministry of Health to all hospitals. Healthcare workers at the National Dermatology Hospital were also at higher risk of COVID-19 infection because they had to be in direct contact with patients' skin. As such, the work pressure and workload of nurses at the hospital increased considerably, which might explain the higher rate of stress in nurses, especially moderate stress.

Factors associated with occupational stress in nurses

This study examined 4 types of factors associated with occupational stress in nurses: personal factors, family factors, work-related factors, and social factors. We examined the effects of these factors on creating stress and enhancing stress in nurses.

Personal factors

Age, educational background, work experience, and regular exercises are factors that distinguish between nurses who have stress and nurses who do not; but only age and educational background increase the risk of severe stress in nurses. Nurses in the 30-39-year-old group are more likely to have stress than younger nurses, and the 30-39 and 40-49-year-old groups are more likely to have severe stress than nurses under 29 years old. Nurses who have higher educational backgrounds are at risk of severe stress than nurses with college or vocational degrees.

We believed that age and educational background do not directly create stress, but rather the family factors and work-related associated with age and educational background lead to occupational stress in nurses. Experienced nurses might be responsible for a higher workload and more difficult work at the workplace, which might explain why older nurses and nurses with higher educational backgrounds face more severe stress. Milutinović, Golubović, Brkić, and Prokeš [29] also reported that nurses in the 30-39-year-old had more problems with colleagues and problems with supervisors, leading to their higher levels of stress as compared to younger and older coworkers. Moreover, in Vietnamese culture, people tend to get married at around 30 years old, so nurses in the 30-39-year-old group are likely to have children aged under 5. The fact that they have to balance between work and family responsibilities might explain why nurses in this group get stress easier and more severe than the younger group.

Among health behaviors examined, smoking and drinking do not affect the stress level of nurses, but regular exercise can prevent stress, as nurses who do not exercise regularly are at risk of stress 5 times more than nurses who exercise regularly.

Family factors

This study found that nurses who have children, those who have to raise children aged under 5, and nurses who do not get support from their families are at higher risk of getting stress, but these factors only

create stress, not elevate the severity of stress. Clearly, balancing between roles at work and home is a stressor for nurses, while family support acts as a stress buffer. This finding is in line with previous reports on the effect of work-family conflict and turnover intention of nurses, especially those in collectivism cultures. [15,30]

Work-related factors

Of the 4 types of work-related factors examined, workload and working conditions have the most impacts, with the highest odd ratios belonging to these two types. High workload has been found to be a predictor of occupational stress (2), as such this study echoes previous studies. It is important to note that high workload refers to the number of tasks given beyond one's ability or beyond one's position, not the number of working hours like frequency of night shifts or overtime work. As such, nurses feel stressed when they are given too many unexpected tasks, not when they have to work for long hours. However, work overload is not a factor that elevates the severity of stress, meaning that nurses who are frequently given high workloads have found a way to cope with it.

Nearly all working conditions examined in this study are related to stress in nurses, from working equipment to room temperature, lighting, space, etc. This finding is in line with Trinh and Ta's report (31), yet the odd ratios of working conditions in this study are considerably higher than the report. It is possible that in the context of the COVID-19 pandemic when nurses and doctors have to wear protective suits for long hours when in direct contact with patients, unsuitable working conditions enhance the discomfort of nurses much more than usual conditions.

Relationships with patients and their caregivers are a significant stressor for nurses because uncooperative patients not only make nurses feel stressed but they also increase the severity of stress among nurses. With the patient-centered nursing care model becoming popular, patients' and caregivers' expectations for nursing services can be demanding, creating burdens for nurses (21). When their expectations are not met, patients and their family members can have negative responses to nurses, such as anger, insults, refusal of cooperation during treatment, etc. These negative responses are signs of distrust and disrespect to nurses, leaving them feel stressed. In a qualitative study on occupational stress of nurses in Iran, Adib-Hajbaghery, Khamechian, and Alavi (32) also found patients' negative remarks as a stressor to nurses.

Nurses' perception of fairness at work is another factor that causes and elevates stress in nurses. Unfair treatment stresses nurses because it makes them feel undervalued, which in the long run demotivates nurses and leads to job dissatisfaction and turnover. This finding is consistent with Rodwell and Munro (33), in which organizational justice is negatively correlated with depression in nurses.

Social factors

Relationships with supervisors and coworkers are two sources of stress in nurses, but only relationship with supervisors elevates stress in nurses. Previous studies have found that social support at work can reduce occupational stress in nurses (34), while certain leadership styles such as laissez-faire and destructive leadership can be toxic to nurses' mental health (35-36). Thus, a good, supportive relationship between nurses and their supervisors acts as a stress buffer.

Strengths and limitations of the study

To our knowledge, this study is among the first to test multiple-level factors associated with stress in nurses, with 50 independent variables examined. The substantial number of factors allow us to draw the big picture of factors associated with stress in nurses. Moreover, this study points out not only factors that create stress in nurses but also factors that elevate the severity of stress. It is clear from the findings that not all factors that create stress are factors that elevate stress, as only a few factors distinguish the severe and highly severe stress groups from the mild and moderate stress groups. Thus, this study implies that stress management interventions need to focus on certain stressors such as relationships with patients and supervisors/leaders, fairness, and welfare for nurses, but to create a stress-free working environment requires attention to many more factors, from family-related factors to work-related and social factors.

This study has some limitations. Firstly, the study was conducted in one national hospital specializing in dermatology, thus the results might not be representative of nurses working in other settings, such as critical care units. However, it should be noted that many of the findings on sources of stress in this study are consistent with previous findings, including findings conducted in critical care units, palliative care units, etc. Secondly, the cross-sectional design of the study prevents the authors from drawing any causal conclusions about factors causing stress. Future studies can utilize longitudinal design to prevent this shortcoming.

Conclusions

This study reported the prevalence of stress among nurses at a national dermatology hospital in Vietnam. All nurses participating in the study reported at least 1 symptom of stress, and half of the nurses (51.9%) met the criteria for stress according to DASS-21. Given that data were collected during the time of the COVID-19 pandemic at a non-front-line hospital, this is an alarming rate of occupational stress among nurses. Factors related to stress among nurses included personal, family, work-related and social factors. While many factors in these four groups created stress in nurses, only work-related and social factors elevated the severity of stress in nurses. These findings provided important implications for hospital management, as most of the factors that elevate stress can be addressed by system-level interventions, such as management of professional relationships,

organizational justice, and welfare system. As existing studies have examined occupational stress interventions at the personal level (through stress management programs for healthcare workers), future studies can examine how system-level interventions can support healthcare workers, in particular nurses, to cope with stress and improve their mental wellbeing.

Ethics approval and consent to participate

The study was approved by the Scientific and Ethical Committee in Biomedical Research, Hanoi University of Public Health, decision 408/2020/YTCC – HD3.

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