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Research Article

Moderated Mediation Analysis of Work-Related Fatigue, Job Dissatisfaction and Burnout on Workplace Violence in Hospital Nurses

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Abstract

Background: Workplace violence (WPV) in healthcare settings is on the rise incrementally. This study assesses the moderated mediation of fatigue on WPV mediated by burnout in two groups of job satisfaction. **Method:** 471 nurses in a hospital voluntarily and anonymously filled out a web-questionnaire including demographics, job characteristics, work-related fatigue, burnout, and frequencies of violence. Hierarchical multiple regression and moderated mediation analysis was used to explore the association between work-related fatigue and WPV mediated by burnout in two groups of job dissatisfaction. **Result:** Based on moderated mediation analysis, burnout was significantly associated with work-related fatigue ($p<0.001$) but not associated with job dissatisfaction. Frequencies of WPV had significant association with work-related fatigue ($p=0.006$) and burnout ($p=0.004$). The direct effect of work-related fatigue on frequencies of WPV was significant ($p=0.0057$). The indirect effect of work-related fatigue on frequencies of WPV mediated by burnout had significant effects in 2 groups of job satisfaction, estimated 43.8% for the group with job satisfaction and 37.9% for the group with job dissatisfaction. **Conclusion:** WPV was directly attributed to work-related fatigue and indirectly to burnout; work dissatisfaction was associated. The sustainable implementation of a WPV prevention program must prioritize reductions in work-related fatigue and burnout in hospital nurses.

Keywords: Work-related fatigue; Burnout; Job dissatisfaction; Workplace violence; Nurses

Introduction

Workplace Violence (WPV) in healthcare settings is on the rise compared to employees in other industries. Indeed, more half of the responding health personnel have experienced at least one incident of physical or psychological violence within the previous year (75.8% in Bulgaria, 67.2% in Australia, 61% in South Africa, 60% in Portugal, 54% in Thailand, 46.7% in Brazil). Ambulance staffs, nurses, and physicians [1] reported the highest rates of offences. Consequently, WPV is a serious public health and has caused a threat to the physical and psychological health. The effects of WPV were associated with job satisfaction, job burnout, and turnover intention for healthcare employees. Job support acted as a mediating factor on the association [2]. Physicians and nurses experienced worry about WPV, on-call duty and shift work, experience of bullying and verbal abuse were significantly correlated with the intrinsic and extrinsic job satisfaction [3]. Although WPV is a work stressor which is presumed to lead to burnout, social support is hypothesized to buffer the impact of such a stressor on health outcomes [4]. Previous studies has indicated various casual factors that results in WPV, including staff shortages, level of workload, undone nursing tasks. Increased

patient morbidities, and task-level interruptions to workflow. Based on the human factors, WPV events in hospitals may be attribute from heavy workload and work-related fatigue. Physical and emotional violence among nurses was associated with increased reports of compromised standard (job level) and interruptions and higher patient acuity (task level) [5].

Evidence has identified job stress to be one of the most frequent global health issues about occupational activities and mental health [6], especially for the healthcare workers. Nurses were deemed a high-risk occupational group for experiencing depressive symptoms due to high job demands, job characteristics, and complex environmental conditions [7]. High workloads and responsibilities with limited nursing staff in Taiwan has led to a variety of negative outcomes included higher levels of stress and depression, burnout, lower patient satisfaction, and intention to leave. Under Taiwan's National Health Insurance (NHI) policy, the ratio of nurses to patients in Taiwan is 5-12 for day shifts and 7-20 for night shifts which when compared to 4-5 and 8-10 in Australia and USA, respectively, is extremely inadequate [8]. A study [9] in Taiwan indicated high turnover rates of 17% of 8772 registered nurses (RNs) and 22.1% of 4602 new nurses with work tenure in under 3 months in medical centers in 2009. Similarly, the 12-country Registered Nurse Forecasting (RN4CAST) study stated that on average about one in three nurses would leave their current job if they had the opportunity, ranging from 19% in the Netherlands to 61% in Greece [10]. The most common reasons were poor work environment, experiencing violence in the workplace, and job dissatisfaction and burnout [11,12].

To date, there is still no clear consensus on how to well define WPV. The NIOSH classifies WPV into four basic types; Types II and III are the most common in the health care industry. Occupational hazards from WPV frequently occurs from customers/clients to healthcare workers in the hospital setting, which included physical attacks, verbal abuse, psychological tension, and sexual harassment. Over 50% of nurses on the front line have experienced violent incidents in their workplace [13,14]. In Taiwan, personal factors, workplace factors, and situational environmental factors have been found to contribute to the risk of WPV in nurses. Nurses with anxiety had high risks of verbal abuse (OR=4.7) and bullying (OR=2.7), while night work also increases the risk of experiencing sexual harassment (OR = 2.3) [14]. It is understandable how work-related stress and anxiety caused from high job demand and burnout eventually result in WPV among healthcare workers who are navigating poor communication gaps with patients and their relatives. Due to long-term exposure to extreme stress and violent events, nurses frequently suffer from post-traumatic stress disorder (PTSD) [15,16] and psychological symptoms occur (re-experiencing, avoidance, and arousal) for at least one month. Most nurses who experienced violent events had burnout and poor health-related quality of life (HRQoL) and are expected to eventually leave work. In fact, WVP among nurses is preventable worldwide. However, limited evidence has elucidated the mechanism of WPV's contributions directly and indirectly to fatigue and burnout in healthcare workers. The complex relationship between fatigue, burnout, and job dissatisfaction on WPV against nurses has not yet been well verified. Therefore, mediation analysis was conducted to examine a theoretical model of relationship between work-related fatigue and frequencies of WPV mediated by burnout in hospital nurses. In addition, moderated mediation analysis was used to test the hypothesis that job satisfaction acts as a moderator for the relationship between fatigue and burnout on frequencies of WPV.

Methods

Study population

This was a cross-sectional quantitative study in a governmental hospital located at Northern Taiwan. Each nurse signed an informed consent and anonymously filled out a structured questionnaire, which included demographic information, health behavior, job characteristics, a Karasek's Job Content Questionnaire (JCQ) [17], and four types of violence. 471 valid questionnaires were completed and returned. The overall response rate was 94%. Reasons for non-response included vacations, requested time off, and limited time to complete the questionnaire, and they do not affect the study's objective. Participant demographic characteristics are presented in Table 1. Ethical approval was received from the institutional review board of the Provencal Taipei hospital. Ethical approval obtained from the Taipei Hospital Ministry of Health and Welfare Research Ethics Committee (CCH IRB No:TH-IRB-0019-0039)

		n(%)	Freq. of WPV	p
Age (years)				0.2
	≦30	117(37.6)	1.44±1.80	
	31-50	212(45.0)	1.29±1.60	
	≧51	82(17.4)	1.02±1.78	
Education (year)				0.206
	≦12	57(12.1)	0.95±1.93	
	13-15	143(30.4)	1.27±1.66	
	≧16-18	271(57.5)	1.39±1.70	
Marital status				0.2
	Single	229(48.6)	1.42±1.81	
	Married	204(43.3)	1.14±1.52	
	Other	38(8.1)	1.42±2.04	
Work schedule				0.829
	Fixed	299(63.5)	1.32±1.55	
	Non-fixed	172(36.5)	1.28±1.81	
Managerial Position				0.271
	Yes	23(4.9)	0.9±1.41	
	No	448(95.1)	1.32±1.73	
Work-related fatigue				<0.001
	Yes	200(42.5)	1.79±1.88	
	No	271(57.5)	0.94±1.49	
Job dissatisfaction				<0.001
	Yes	80(17.0)	2.24±1.90	
	No	391(83.0)	1.10±1.61	
Burnout				<0.001
	Yes	149(31.6)	1.99±1.93	
	No	322(68.4)	0.98±1.51	

Table 1: Demographics and job characteristics associated with frequencies of workplace violence (WPV) (N=471).

Measurement of burnout, work-related fatigue, and job satisfaction

Burnout has been viewed as a job-induced syndrome combining pervasive fatigue and loss of motivation [18]. Levels of burnout in each nurse were assessed by the Copenhagen Burnout Inventory (CBI) developed by Kristensen [19] and used the version translated to Chinese (C-CBI) by Cheng and Chang (2007). Reliability and validity tests were examined by Cronbach's Alpha and by exploratory factor analysis, respectively. Seven items of burnout were measured and experienced during the previous one year. Responses were scored on 4-point Likert's scale, from 0 ("never") to 4 ("always"). The maximum score was 28 with a higher score representing a higher burnout level. The burnout scores were classified into a high group ≥15 points and a low group ≤14 points. The Cronbach' α of the scale was 0.932 in the current study. However, burnout, caused by work-related characteristics, such as, job, coworkers, one's supervisor, customers/clients, and poor work culture, had negative symptoms of anger, frustration, emotional exhaustion, cynicism, and withdrawal. Burnout gradually emerges over time as the work-related attributes, such as high workload, lack of resources, and long shifts, pile up. Since burnout describes the impact of a stressful workplace, it needs a longer recovery time than work-related fatigue. Self-reported items included feelings of weakness, frustration, emotional exhaustion, anxiety, tiredness, and a lack of energy during workday. Work-related fatigue and burnout are two types of job stress that bring

about mental, physical, and emotional exhaustion in the workplace. Symptoms of work-related fatigue are headaches, sadness, grief, avoiding working with certain people, nightmares, and changes in belief systems. Each nurse was further asked, "Do you feel your job associated with the above-mentioned fatigue symptom?" with response options of "none", "possibly related" and "quite related". Work-related fatigue was assessed using five questions with a 5-point Likert's scale, from 0 ("never") to 4 ("always "). The maximum score was 20 with a higher score representing a higher work-related fatigue level [20]. Cronbach' α of the scale was 0.92 in the current study. Job satisfaction represents the extent to which personnel's demands and desires are met within the workplace and was self-reported using one question with a five point scale ranging from 'highly disagree=1' to 'highly agree=5'. Job satisfaction was classified into two groups: job satisfaction group with scores ≥4 and job dissatisfaction group with scores ≤3.

Outcome Measurement

Workplace violence (WPV) experienced by each nurse included physical violence (including hitting, shooting, kicking, slapping, pushing, biting, pinching, wounding using sharp objects, and sexual assault and rape) and psychological violence (including verbal abuse, threats, and sexual harassment) [21-22]. Frequencies of WPV in nurses were self-reported based on their experiences in the previous year. However, the study did not use the Health Violence Questionnaire (QVS) to evaluate retrospectively the risk factors of the phenomenon of WPV suffered by nurses, such as type of aggressors, typology of the victims of violence, places and times of violence, consequences, and the health impact of nurses etc. [23].

Statistical Analysis

All statistical analyses were conducted using SPSS24.0. Statistical significance was defined as a two-tailed p-value of<0.05. Data are expressed as mean ± standard deviation (SD) for continuous variables and percentage for categorical nominal variables. The correlations of study variables (work-related fatigue, burnout, job dissatisfaction, and frequencies of WPV) were analyzed by Pearson correlation analyses. Hierarchical multiple regression analysis examined the frequencies of WPV associated with demographics and job characteristics, and the predictors and study variables were standardized.

The moderated mediation model was analyzed using Model 7 based on the PROCESS macro for SPSS [24]. The bias-corrected 95% confidence interval (CI) was calculated with 5000 bootstrapping re-samples. We tested whether the association between work-related fatigue and frequencies of WPV symptoms were mediated by burnout (Figure). In addition, moderated mediation effect was observed, that was, and job satisfaction moderated the direct and indirect effects of work-related fatigue on burnout. If the 95% CI of indirect effect did not contain 0, it indicated that the mediating effect was significant. Similarly, if the 95% CI of the interaction did not contain 0, a significant moderated mediation effect could be established.

Results

Frequency of WPV associated with demographics and job characteristic

Table 1 shows the demographics and job characteristic associated with frequency of WPV in 471 nurses. There are no significant association between demographics and job characteristics with frequencies of violence. Younger nurses, those with high education levels, and non-managerial positions had high frequencies of violence but no significant difference. However, nurses with high work-related fatigue, job dissatisfaction, and high burnout had significantly high frequencies of WPV.

Table 2 showed that Pearson's coefficients were used to explore the correlation between work-related fatigue, burnout, and job dissatisfaction with frequencies of WPV. There were significant correlations between each variable. Frequency of WPV was significantly correlated with work-related fatigue (r=0.335), burnout (r=0.322), and job dissatisfaction (r=0.201). In addition, work-related fatigue significantly correlated with burnout (r=0.748) and job dissatisfaction (r=0.298). Burnout significantly correlated with job dissatisfaction (r=0.488).

	WRF	Burnout	WPV	Mean±SD
1. Work-related fatigue	-			42.7±19.4
2. Burnout	0.748**	-		12.6±5.1
3. Workplace violence	0.335**	0.322**	-	1.05±1.23
4. Job dissatisfaction	0.298**	0.488**	0.201**	2.88±0.76
**p<0.01				

Table 2: Correlation matrix of work-related fatigue (WRF), burnout, job dissatisfaction (JDS), and frequencies of workplace violence (WPV).

Frequencies of WPV associated with demographics, job characteristics, work-related fatigue, burnout, and job dissatisfaction using hierarchical multiple regression

Hierarchical multiple regression analysis was used to test the association between frequencies of WPV with demographics, job characteristics, work-related fatigue, burnout, and job dissatisfaction in Table 3. There were no significant associations between demographic and job characteristics with frequencies of WPV. Frequencies of WPV had significant correlation with

work-related fatigue and burnout, and the 11.7% of variation in frequencies of violence were explained. However, there was no significant correlation in job dissatisfaction.

	Step 1	Step 2	Step 3
Demographics			
Age	-0.072	-0.047	0.009
Education	0.054	0.088	0.08
Marital status	0.006	0.015	0.019
Job characteristics			
Job schedule		0.001	0.029
Managerial Position		0.043	0.051
Nightshift		-0.093	-0.081
Job stress			
Work-related fatigue			.157*
Burnout			.182*
Job dissatisfaction			0.058
R^2(%)	0.9	2	13.7**
ΔR^2(%)		1.1	11.7**
*p<0.05 **p<0.01			

Table 3: Frequencies of workplace violence (WPV) associated with demographics, job characteristics, and predictors using hierarchical multiple regression analysis.

Moderated mediation analysis of fatigue and job dissatisfaction on burnout and WPV mediated by

Table 4 indicated moderated mediation analysis of fatigue and burnout on WPV mediated by job dissatisfaction. Burnout, as an outcome, was significantly associated with work-related fatigue (p<0.001) but not associated with job dissatisfaction. Interaction of work-related fatigue and job dissatisfaction was marginally significant (p=0.062). When frequencies of violence was an outcome variable, it had a significant association with work-related fatigue (p=0.006) and burnout (p=0.004). In Table 5 and Figure 1, the mediation effect of burnout on the relationship between work-fatigue and frequencies of WPV was 75.6% based on job dissatisfaction (β=0.014 for job dissatisfaction, p<0.01 and β=0.011for job satisfaction, p<0.01). Results reveals frequencies of WVP greatly contribute to the impact of burnout. Index of moderated mediation attributing from job dissatisfaction was -0.0022, but it was not significant. There are not significant moderation effect of work-fatigue and job dissatisfaction on burnout, but burnout still acts as a mediator on the relationship of work-fatigue and WVP, irrespective for job dissatisfaction.

	B(SE)	p	LLCI	ULCI
Outcome：Burnout				
WRF	0.216(0.011)	<0.001	0.195	0.236
JDS	1.27(0.78)	0.108	-2.79	0.27
Interaction: WRF *JDS	0.035(0.019)	0.062	-2.79	0.27
Outcome：WPV				
WRF	0.018(0.006)	0.006	0.005	0.031
Burnout	0.063(0.022)	0.004	0.019	0.106

Table 4: Moderated mediation analysis of work-related fatigue (WRF) and job dissatisfaction (JDS) on burnout and workplace violence (WPV).

Direct effect of WRF on WP			
B(SE)	p	LLCI	ULCI
0.018(0.007)	0.0057	0.0053	0.0312
Indirect effect of WRF on burnout and violence WPV			
Job dissatisfaction			
yes	0.014(0.004)	0.005	0.022
no	0.011(0.004)	0.004	0.019
Index of moderated mediation			
	Index (Boot SE)	Boot LLCI	Boot ULCII
Job satisfaction	-0.0022(0.0015)	-0.0056	0.001

Table 5: Direct and indirect effects of work-related fatigue (WRF) and burnout on frequency of workplace violence (WPV).

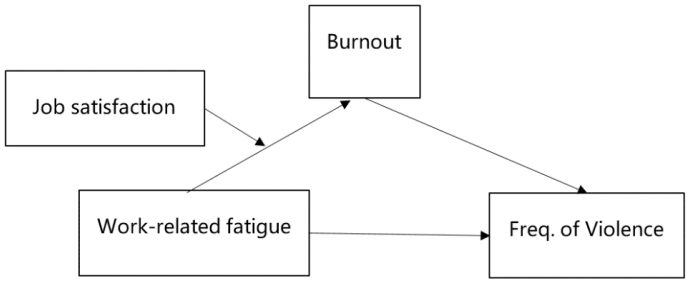

Figure : 1Schematic model of job satisfaction as a moderator for the association between work-related fatigue and violence at a hospital mediated by burnout (Andrew Haye`s moderation-mediation model 7).

Discussion

The results indicated frequencies of WPV were significantly associated with work-related fatigue (p=0.006) and burnout (p=0.004). The mediation effect of burnout greatly impacted

(explained by 75.6%) the relationship between work-fatigue and frequencies of WPV. In addition, the study indicated a high correlation between fatigue and burnout (r=0.75). Fatigue and burnout are two types of work-related stress that results in mental, physical, and emotional exhaustion in nurses. Feelings of burnout emerge gradually over time as the result of work-related attributes, but fatigue occurs through rapid onset by exposure of traumatic events. In general, compassion fatigue (CF) can be a precursor of burnout. Work-related fatigue in healthcare workers has been mostly defined as CF, which is induced by the cost of caring for others in emotional distress. The intense emotional and physical exhaustion beyond their capacity along with insufficient support from colleagues contributes to nurses' CF. A meta-analysis from 21 studies indicated the prevalence rates of CF and burnout were 52.55% and 51.98% in nursing [25], higher than those in this study which were 42.5% and 31.6%, respectively. Emotional burnout can progressive when nurses with CF have felt tired, powerless, and overwhelmed at a task that they cannot change over a long period of time, resulting in more WPV. Therefore, fatigue has a detrimental effect on safety and medical care for patients.

Ma'mari et al. [26] indicated patient safety was significantly associated with fatigue, work environment, emotional exhaustion, depersonalization, and personal accomplishment. Burnout results from prolonged exposure to stressful workplace where job demand exceed their capability. When nurses are more prone to feeling irritable, forgetfulness, self-blame, exhaustion, less compassion or even indifference, or a sense of numbness toward others, the chances of conflicts and WPV between nurses, patients, and their families increases. As a result, nurses with CF experienced more personal feelings of distress when they perceived others suffering and less feelings of empathy and sensibility to patients' suffering, which lead to more violent events with patients and their relatives [27]. Importantly, it is crucial to promptly engage an effective intervention program to moderate the effects of a traumatic event or a stressful workplace, such as mindfulness practice, relaxing activities, and support from colleagues or supervisor etc. [28].

In the study, experiences of WPV for nurses in the previous year were psychological abuse (41.0%), then verbal abuse (37.0%), physical assault (17.0%) and sexual harassment (9.0%). Our results are similar to a previous study in Hong Kong which were verbal abuse/bullying (39.2%), then physical assault (22.7%), and sexual harassment (1.1%), respectively. The most common perpetrators of WPV were patients (36.6%) and their relatives (17.5%), followed by colleagues (7.7%), and supervisors (6.3%) [29]. In Taiwan, as in other countries, the rates of physical and verbal violence have increased in emergency department nurses, and the physical and verbal rates of violence range from 19.0-28.6% to 65.1-78.7% respectively [30-33]. WPV remains a significant concern for healthcare workers worldwide, and it needs to be understood that possible mechanisms contributing to WPV is fatigue and burnout. Overall, nurses with CF in long-term circumstances with inadequate resources results in poor communication skills with patients and their relatives. People unfamiliar with standard operational procedure in medical care and with unrealistic expectations can also trigger violent events in a healthy setting.

In the study, moderated mediation analysis has examined the direct effect of work-related fatigue significantly associated with frequencies of violence (p=0.0057). In addition, the indirect effect of work-related fatigue on frequencies of WPV mediated by burnout had significant effects based on two groups of job satisfaction. It reveals the WPV did not only directly contribute to CF and burnout, but burnout mediated the relationship between fatigue and frequencies of WPV. Our findings are consistent with a previous study [33], which indicated WPV were significantly related to burnout but not related to traumatic stress. In our results indicated job dissatisfaction was significant associated with burnout, but it did not act as a moderator on the relationship between work-related fatigue and burnout. It is explained that job dissatisfaction was significant associated with work-related fatigue and burnout. Thus, the index of moderated mediation was not significant. Whereas there are not significant moderation effect of work-fatigue and job dissatisfaction on burnout, burnout still acts as a mediator on the relationship of work-related fatigue and WVP, irrespective for job dissatisfaction. Notably, burnout was significant triggers on WVP under certain circumstances, might motivate nurses to behave violently with patients or lead to patient-perpetrated violence. Our findings are similar to a previous study in two teaching hospitals of Pakistan [34], which confirms that patient violence toward nurses leads to nurse violence toward patients through the mediating effect of burnout. As a result, burnout may act as a trigger between patient violence and nurse violence. Our findings suggested that WPV might be a long-lasting or cumulative stressor rather than a brief, extreme exhaustion experience. Compared to our findings, Yeh's study [35] in Taiwan examined the mediating roles of job control, psychological demands, and social support for the relationship between WPV and turnover intention using a structural equation model. The results indicated nurse-experiencing WPV were significantly associated with turnover intention. However, the mediation variables (job control, psychological demands, and social support) were considered, and the effect of WPV on turnover intention was not significant. It reveals that influencing factors of fatigue and job satisfaction were not measured, which may result in a reverse causal link. A systematic review article [36] stated a significant association between burnout symptoms and physical violence at work, which can be moderated by structural/organizational factors (social support, quality of the working environment, authoritarian leadership, little autonomy or long working days, etc.) and personal factors (age, gender, nationality, academic degree, etc.). Therefore, our results also demonstrated

that job support from peers or directors are negatively associated with levels of CF ($r=-0.110$, $p<0.05$), burnout ($r=-0.203$, $p<0.01$), and frequencies of WPV ($r=-0.123$, $p<0.01$) (Data not shown), which is similar to previous studies [35]. Obviously, job support may empower victims of WPV to actively play a positive role in their nursing professionals and enhances their ability to deal with negative emotions when facing traumatic events or WPV [32,37]. Further research is needed to elaborate the effects of job support or organizational climate when added into the model to assess the association of work-related fatigue and burnout on WPV.

The relatively high response rate is a strength of this study for examining the moderated mediation effect between fatigue and burnout on frequencies of WPV based on job satisfaction in hospital nurses. Our results demonstrated frequencies of WPV were contributed to directly and indirectly by fatigue and burnout, respectively for job dissatisfaction. However, some limitations in the study have been identified; in particular, the study was a cross-sectional design at a specific time, unable to establish a causal relationship. Further researchers may consider using a longitudinal study to examine the relationship between fatigue, burnout, and job dissatisfaction with WPV. In addition, the selection bias from the healthy worker effect may have led to a reverse causal link and underestimation of the association. Although influencing factors of WPV may not be completely measured and considered, such as job support, administrative climate, intent to leave etc., this should be considered an initial examination of the causal relationship by a structural equation model. Finally, since the web-questionnaire data was collected through anonymous self-reporting, we did not use objective tools to assess the consistency between levels of fatigue and burnout subjectively reported, such as oculomotor behavior, observer-rated facial expression, typing performance, and fatigue biomarker index [38]. There are still some barriers to accurately and sensitively assessing levels of fatigue in healthcare workers, related factors to fatigue make it difficult to completely promise control and objective measurement of fatigue and burnout. Further research will need to consider means for accurately measuring fatigue and burnout by objective tools.

Conclusion

The study indicated frequencies of WPV are significantly associated with work-related fatigue and burnout using hierarchical multiple regression analysis. Based on moderated mediation analysis, frequencies of WPV had significant associations with work-related fatigue and burnout. The direct effect of work-related fatigue on frequencies of WPV was significant. The indirect effect of work-related fatigue on frequencies of violence mediated by burnout had significant effects in the two groups of job satisfaction, which estimated by 43.8% for the group with job satisfaction and 37.9% for the group with job dissatisfaction. Thus, hospital managers or administrators should provide healthcare professionals a violence‐free and safe workplace with zero tolerance for WPV by promptly taking steps to prioritize reducing work-related fatigue and burnout in hospital nurses. In addition, nurses need to not only enhance their coping and problem‐solving skills, reinforcing their individual resilience, but modification of workplace structures are needed to empower them against fatigue and burnout.

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