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Original Article

Psychological stress responses of medical staff after workplace violence: a longitudinal study

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Abstract: Objective: To explore the occurrence and dynamic trends of psychological stress responses of medical staff experiencing workplace violence at different time points. Methods: A longitudinal study of 23 medical workers who experienced workplace violence was conducted. The perceived stress scale (PSS-4), posttraumatic stress disorder checklist for DSM-5 (PCL-5), and hospital anxiety and depression scale (HADS) were used to measure the medical workers' psychological perception of pressure, posttraumatic stress symptoms, anxiety, and depression at the time of exposure to violence, at 1 month, 2 months, and 4 months after exposure in the workplace, respectively. Repeated measures analysis of variance was applied to analyze psychological stress response and temporal effect. Factors influencing psychological stress responses were analyzed. Results: The scores of PSS-4, PCL-5, HADS-anxiety, and HADS-depression of medical staff exposed to violence began to increase at the time of exposure, peaked 1 month after exposure, and gradually decreased 2 months and 4 months after exposure (all $P<0.05$). The main influencing factors were being nurses, physical violence, working years ≤5, and being female. Conclusion: Effective interventions for medical staff should be made up to 1 month after exposure to workplace violence when the psychological stress responses are the highest.

Keywords: Medical staff, workplace violence, psychological stress, intervention, longitudinal study

Introduction

Medical staff are at a high risk for workplace violence, which is one of the most complex and dangerous occupational hazards. Violence in hospitals refers to any incident in which a healthcare worker is verbally abused, threatened, or assaulted, reducing in personal safety [1-3]. Workplace violence causes negative emotional responses and even post-traumatic stress disorder (PTSD) [4, 5].

PTSD is a delayed stress response or mental dysfunction that develops after exposure to a traumatic event that exceeds tolerance. The patient with PTSD always recalls traumatic events. They are prone to affective disorders and high vigilance despite making efforts to avoid trauma-related stimuli [6, 7]. A hospital is a public place of patients with various critical illnesses. Many untoward events such as severe trauma, death, and suicide are frequently seen in a hospital. With their high labor intensity and high technical requirements, medical staff are susceptible to PTSD once they have experienced verbal abuse or assault [8, 9]. At present, most of the studies on psychological stress disorder response of medical staff exposed to workplace violence are cross-sectional epidemiological surveys, with short follow-up time, so the results are incomplete to a certain degree [10]. Based on the above information, this study explored the changes in the psychological state of medical staff after encountering workplace violence, and aimed to provide a more theoretical basis for interventions after exposure.

Materials and methods

General data

A total of 23 medical workers who suffered from workplace violence from January 2018 to

December 2020 in Shijiazhuang Fourth Hospital were selected as research subjects. This study has been approved by the Ethics Committee of Shijiazhuang Fourth Hospital (No. 20220163). All the medical staff signed the informed consent.

Inclusion criteria: (1) Medical staff experienced workplace violence for the first time. (2) Medical staff were registered in the hospital. (3) Medical staff with at least 1 year of work experience.

Exclusion criteria: (1) Medical staff experienced workplace violence again during follow-up. (2) Medical staff had a history of psychiatric disorders. (3) Medical staff had received adjuvant psychotherapy recently. (4) Medical staff had recently suffered from serious illnesses or made major mistakes in their work.

Methods

Based on literature research, the scores of perceived stress scale (PSS-4), PTSD Checklist for DSM-5 (PCL-5), and hospital anxiety and depression scale (HADS) of the medical workers were analyzed at the time of exposure to violence, and at 1 month, 2 months, and 4 months after exposure [11].

PSS-4

The PSS-4 was used to measure the level of perceived stress using a 5-point Likert scale from 0 (never) to 4 (very often). Higher score indicates higher levels of perceived stress [12].

PCL-5

The PCL-5, consisting of a 20 itemquestionnaire with a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely) for each item, was used to measure PTSD. Total score was ranging from 0-80. Higher score indicates more serious PTSD [13].

HADS

The HADS, including 14 questions with a 4-point Likert scale for each question, was used to measure the levels of depression and anxiety. A higher score represents more serious depression or anxiety [14].

Intervention methods

Treatment and psychological intervention were carried out for medical staff subjected to workplace violence. On one hand, medical workers suffering from workplace violence could enjoy one-week paid leave. Daily condolences, reassurance and understanding of their mental state were performed by full-time staff. Also, these victims received psychological interventions after they returned to the hospital in a week. During team building, workplace violence scenes were simulated many times to help them to correctly understand the stressful environment. The victims were informed of their inadequacies in dealing with violence and how to correct them. The psychologist informed them of the stress-related mechanisms, assisted them in understanding their response and identifying their symptoms, so as to effectively alleviate the symptoms. Then their current situation and their problems were pointed out, so that they could accept reality and have a more stable mental state. Finally, real-time monitoring of psychological changes was done, after positive psychological interventions like music, listening, reassurance and family social support.

Statistical analysis

SPSS 23.0 software was adopted for statistical analysis. Measured data with normal distribution were expressed as mean ± standard deviation ($\bar{x}$ ± sd). The comparison of PCL-5 scores, PPS-4 scores, and HADS scores at different time points was analyzed by repeated measures analysis of variance. Pairwise comparisons were carried out using post hoc LSD t-test. Counted data were represented as percentage (%) and tested by Pearson's chi-square test. *P*-values <0.05 were considered significant differences. Logistic regression analysis was used to analyze the influencing factors on psychological stress responses after workplace violence. The Ward method was used for variable screening, with inclusion criteria of 0.05 and exclusion criteria of 0.10. Risk avoidance was expressed with an OR value.

Results

General data of the subjects

There were 23 medical workers who had experienced workplace violence, with age ranging

Table 1. General data of subjects (n)

Item	Case	Proportion (%)
Gender		
Male	13	56.52
Female	10	43.48
Age (years)		
≤25	11	47.83
>25	12	52.17
Education level		
Technological academy	5	21.74
Bachelor's degree	13	56.52
Master's or above	5	21.74
Job title		
Junior	10	43.48
Intermediate	8	34.78
Senior	5	21.74
Marital status		
Unmarried	13	56.52
Married	10	43.48
Divorced	0	0.00
Jobs		
Nurses	15	65.22
Doctors	8	34.78

from 21 to 54 years old and work experience of 1-20 years. See **Table 1**.

Comparison of PCL-5 scores at different time points

The PCL-5 scores were analyzed using repeated measures analysis of variance at different time points. The PCL-5 scores of medical staff exposed to violence began to increase the at time of exposure, peaked at 1 month after exposure, and gradually decreased 2 months and 4 months after exposure (all $P<0.05$, **Figure 1**). Additionally, the PCL-5 scores were higher in nurses than in doctors, higher in subjects with working years ≤5 than in subjects with working years >5, higher in males than in females, and higher in subjects who suffered physical violence than those who suffered verbal violence (all $P<0.05$). No significant differences were found in terms of other general data (all $P>0.05$). See **Table 2**.

Comparison of PPS-4 scores at different time points

The PPS-4 scores were analyzed at different time points in doctors and nurses. The PSS-4 scores of medical staff exposued to violence began to increase from the time of exposure, peaked at 1 month after exposure, and gradually decreased 2 months and 4 months after exposure. See **Figure 2**.

Comparison of HADS-A and HADS-D scores at different time points

There were significant differences in HADS-A and HADS-D scores at different time points (both $P<0.05$). The HADS-A and HADS-D scores of medical staff exposed to violence began to increase at the time of exposure, reached the highest 1 month after exposure, and gradually decreased 2 months and 4 months after exposure. See **Figures 3**, **4**.

Logistic regression analysis of factors influencing psychological stress responses after workplace violence

Logistic regression analysis revealed that being nurses, physical violence, working years ≤5, and being female were factors influencing psychological stress responses after workplace violence. See **Table 3**.

Discussion

Workplace violence exists in all walks of life, but research shows that violence in the medical field is much more frequent than in other areas, with an incidence above 50% based on the latest statistics, and most of the violence comes from the patients [15-17]. Among various violence types, verbal abuse is the most common, followed by physical threats and attacks. Once the medical staff experience workplace violence, their perceived pressure increases. Victims can suffer from PTSD, depression, and anxiety. If not dealt with in time, the workplace violence will lead to psychological disorders and further affect the work efficiency and work status of medical staff. Severe workplace violence will cause work mistakes, adverse safety events and suicidal tendencies of medical staff [18-20]. Although positive and effective interventions are of great significance to promote the mental health of medical staff, research on changes in psychological stress after traumatic violence in the workplace is insufficient, which weakens the effect of intervention to a certain extent, so analysis of changes in psychological state after violent stress is an essential prerequisite

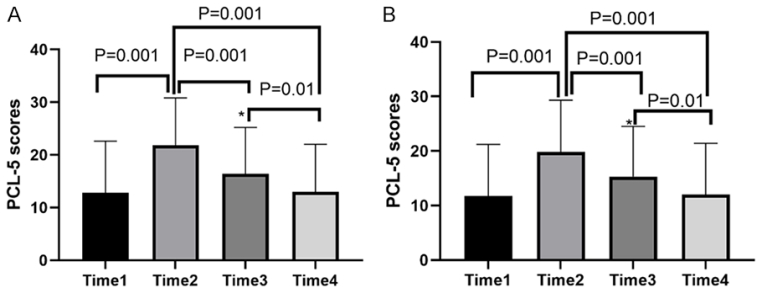

Figure 1. Comparison of PCL-5 scores at different time points in doctors and nurses. A: PCL-5 scores for nurses; B: PCL-5 scores for doctors. Time 1: time of exposure to violence; Time 2: 1 month after exposure; Time 3: 2 months after exposure; Time 4: 4 months after exposure. Compared to Time 1, and Time 3, *P<0.05. PCL-5: posttraumatic stress disorder checklist for DSM-5.

Table 2. Comparison of PCL-5 scores at different time points

Item	PCL-5 scores	t/F	P
Gender		0.774	0.448
Male	24.5±2.2		
Female	25.7±1.9		
Working years		0.251	0.804
≤5	25.8±1.8		
>5	24.6±2.0		
Education level		0.190	0.981
Technological academy	25.1±1.9		
Bachelor's degree	25.2±2.0		
Master's or above	25.0±2.1		
Job title		0.048	0.952
Junior	25.4±1.8		
Intermediate	25.2±1.9		
Senior	25.1±2.1		
Marital status		0.117	0.908
Unmarried	25.2±1.9		
Married	25.1±2.2		
Divorced	-		
Jobs		3.512	0.049
Nurses	25.5±2.0		
Doctors	23.1±1.5		
Others	24.3±2.1		
Type of violence suffered			
Physical violence	25.8±1.2		
Verbal violence	24.1±1.0		

Note: t: data from independent sample t-test; F: data from one-way analysis of variance; PCL-5: posttraumatic stress disorder checklist for DSM-5.

to improve the effectiveness of psychological intervention [21].

In this study, time-related changes were observed in perceived stress, PTSD, anxiety, and depression among 23 medical workers (8 doctors and 15 nurses) experiencing workplace violence. The results revealed that the scores of stress disorders and other adverse emotional events reached athe peak at 1 month after exposure, and then gradually decreased, which is consistent with the conclusions of relevant research [22, 23]. Another study has shown that with time, various workplace violence-induced stress disorders gradually decline [24], which is contrary to the conclusions of this study. The reason for the difference may have been their short observation duration (14 days). In addition, from the comparison of general data, nurses, female workers, those with working years ≤5 and workers suffering from physical violence had higher scores than other medical workers. This may be associated with the following factors. First, the public has low regard for nursing work, regarding nursing as a simple service industry, and nursing staff as just a simple "operator". When patients and their families are dissatisfied with the treatment outcome, they tend to blame the nursing staff rather than the doctors for the treatment outcome [25]. Second, with the development of the economy, the patient has an increasing demand for high quality of nursing care, but due to the shortage of medical resources and an imperfect medical system, the patients' demands cannot be fully satisfied, which ultimately results in conflict [26]. Lastly, nurses, as performers of operations and direct communicators with patients, are more likely to experience workplace violence than other medical workers. Furthermore, medical workers with

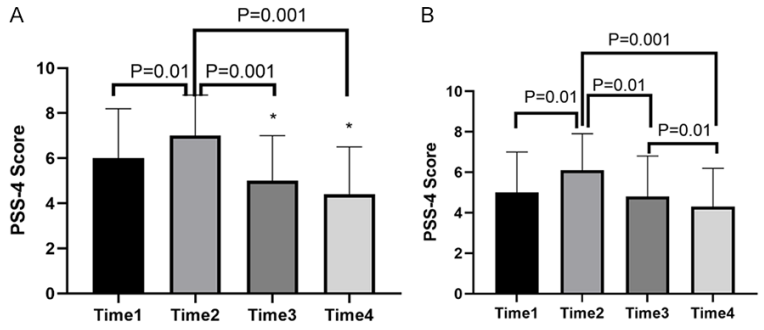

Figure 2. Comparison of PPS-4 scores at different time points in doctors and nurses. A: PSS-4 scores for nurses; B: PSS-4 scores for doctors; Time 1: time of exposure to violence; Time 2: 1 month after exposure; Time 3: 2 months after exposure; Time 4: 4 months after exposure. Compared to Time 1, Time 3, and Time 4, *P<0.05. PSS-4: perceived stress scale.

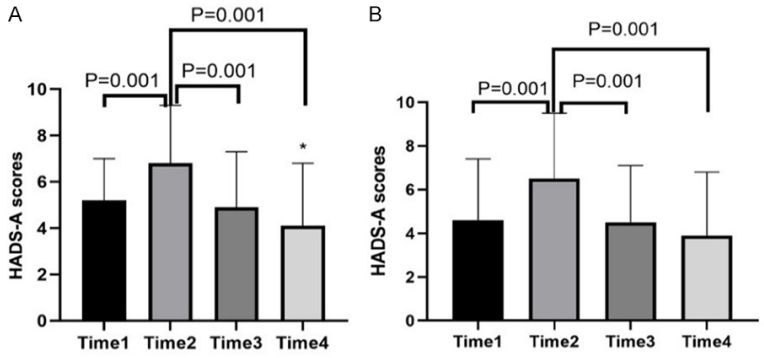

Figure 3. Comparison of HADS-A scores at different time points in doctors and nurses. A: HADS-A scores for nurses; B: HADS-A scores for doctors; Time 1: time of exposure to violence; Time 2: 1 month after exposure; Time 3: 2 months after exposure; Time 4: 4 months after exposure. Compared to Time 1, and Time 4, *P<0.05. HADS-A: hospital anxiety and depression scale-anxiety.

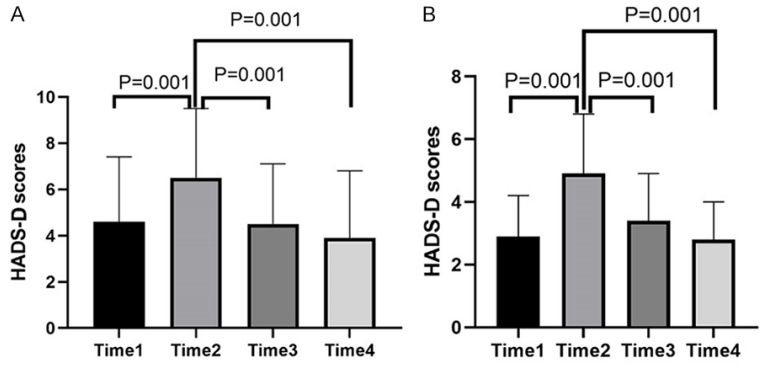

Figure 4. Comparison of HADS-D scores at different time points in doctors and nurses. A: HADS-A scores for nurses; B: HADS-A scores for doctors; Time 1: time of exposure to violence; Time 2: 1 month after exposure; Time 3: 2 months after exposure; Time 4: 4 months after exposure. HADS-D: hospital anxiety and depression scale-depression.

fewer working experiences has less communicating skills to a certain extent. The medical staff with shorter working years have less experience with workplace violence, which aggravates their stress disorder. Compared to verbal violence, physical violence aggravates trauma, and increases psychological stress among medical staff, thus aggravating the degree of psychological disorders. The results in this study revealed that being nurses, physical violence, working years ≤5, and being female were influencing factors for psychological stress response after workplace violence, which is consistent with findings in a previous study [27].

After suffering workplace violence, the hospital adopts a series of measures, such as improving the medical environment, standardizing the operation process, and enhancing communication between doctors and patients. Once a violent incident occurs, effective interventions should be carried out according to the time-effect curve of psychological stress disorder to minimize psychological trauma to medical staff. Cognitive behavioral therapy is effective in relieving stress disorders [28].

Inevitably, there are some drawbacks to this study. First, the sample size was small, a and a multi-center study with large sample size is warranted to further analyze the stress state of medical staff suffering from various types of workplace violence. Second, evaluation of the clinical effect of the intervention is an impor-

Table 3. Logistic regression analysis of influencing factors for post-traumatic stress disorder after workplace violence

Item	Standardized β	SE	Wald χ^2	OR	95% CI	P
Female	1.686	0.84	4.34	3.451	1.452-5.449	0
Nurses	1.745	0.67	3.56	2.778	1.226-4.778	0.001
Working years ≤5	1.664	0.53	3.44	2.021	1.009-3.297	0.004
Physical violence	1.554	0.67	2.87	2.33	1.390-3.338	0.003

tant need to improve the clinical practicability of this study.

In summary, after workplace violence, the perceived stress of medical staff starts to increase from the time of violence and reaches a peak at 1 month after exposure. Nurses, physical violence, working years ≤5, and female sex were the main influencing factors of psychological stress response after workplace violence, providing a preliminary theoretical basis for early psychological intervention.

Disclosure of conflict of interest

None.

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