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Prevalence of Post-Traumatic Stress Disorder (PTSD) and Associated Occupational Factors Among Nurses in Selected Hospitals Affiliated with Birjand University of Medical Sciences, Iran (2024)

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Abstract

Introduction: Nurses are frequently exposed to stressful clinical events, including patient suffering and death, workplace violence, and severe clinical incidents, which may increase their risk of post-traumatic stress symptoms. This study aimed to estimate the proportion of nurses screening positive for probable post-traumatic stress disorder (PTSD) and to examine demographic and occupational factors associated with PCL-5 symptom scores among nurses working in selected teaching hospitals affiliated with Birjand University of Medical Sciences, Iran, in 2024.

Methods: This cross-sectional study included 200 nurses selected through convenience sampling. Data were collected using a demographic and occupational questionnaire and the Persian version of the PTSD Checklist for DSM-5 (PCL-5). The PCL-5 consists of 20 items scored from 0 to 4, yielding a total score ranging from 0 to 80. A total score of ≥35 was used as the threshold for a positive screening result for probable PTSD. Statistical analyses were performed using SPSS software (version 24) and included descriptive statistics, Chi-square test, independent t-test, one-way ANOVA, and Spearman's correlation, as appropriate. Statistical significance was set at $P < 0.05$.

Results: The mean age of participants was 32.64 ± 6.40 years. The mean total PCL-5 score was 31.54±12.30. Based on a cutoff score of ≥35, 81 of 200 nurses (40.5%; 95% CI: 33.7%–47.3%) had a positive screening result for probable PTSD. The mean scores were 8.08±3.54 for intrusion, 3.27±2.18 for avoidance, 10.78±5.20 for negative alterations in cognition and mood, and 9.42±4.93 for alterations in arousal and reactivity. Monthly overtime hours showed a weak positive correlation with PCL-5 scores (ρ=0.148, P=0.037). Overall PCL-5 scores differed significantly across job-rank categories ($F(3, 196) = 3.31$, $P = 0.021$); however, no individual pairwise comparison remained statistically significant after Games–Howell post-hoc adjustment.

Conclusions: A substantial proportion of nurses in the participating teaching hospitals screened positive for probable PTSD. Monthly overtime hours showed a weak positive association with PCL-5 symptom scores, while the overall comparison of PCL-5 scores across job-rank categories was statistically significant; however, no individual pairwise comparison remained statistically significant after Games–Howell adjustment. Given the cross-sectional design, convenience sampling, and use of a self-report screening instrument, these findings should be interpreted cautiously and should not be considered estimates of clinically diagnosed PTSD. Further multicenter studies using probability sampling and structured clinical interviews are warranted.

Key words: Iran, Nurses, Occupational Stress, Stress Disorders, Traumatic

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Introduction

Post-traumatic stress disorder (PTSD) is a psychiatric condition that may develop following exposure to or witnessing a traumatic event involving actual or threatened death, serious injury, or sexual violence [1]. According to the DSM-5-TR, PTSD symptoms are grouped into four clusters: Cluster B, intrusion symptoms (e.g., intrusive memories and nightmares); Cluster C, avoidance of trauma-related stimuli; Cluster D, negative alterations in cognition and mood; and Cluster E, alterations in arousal and reactivity [2]. Although the prevalence of PTSD in the general population is relatively low [3], higher levels of post-traumatic stress symptoms have been reported in occupational groups with repeated exposure to traumatic events [4].

Nurses, as frontline healthcare providers, are frequently exposed to stressful and potentially traumatic clinical experiences, including patient death and suffering, severe injuries, workplace violence, and demanding clinical situations [5]. Repeated exposure to such events may contribute to the development or persistence of post-traumatic stress symptoms [6]. The COVID-19 pandemic also placed substantial psychological pressure on healthcare workers and was associated with increased post-traumatic stress symptoms in healthcare settings [7].

Previous studies among Iranian nurses have reported substantial variability in the proportion of participants meeting PTSD-related thresholds, with estimates ranging from 10.8% to 88% [8,9]. Such variation may be related to differences in assessment instruments, cutoff scores, study populations, clinical settings, and the timing of assessment relative to traumatic or crisis events. In addition, studies using self-report screening instruments may produce estimates that differ from those based on structured clinical diagnostic interviews. Therefore, context-specific assessment using standardized instruments and clearly defined populations remains important.

Various studies in Iran and other countries have reported considerable levels of post-traumatic stress symptoms among nurses. For example, a study conducted in the United States reported severe PTSD symptoms in 35% of nurses [10]. In Iran, Hosseininejad et al. (2019) reported a prevalence of 10.80% among emergency nurses [8], whereas Esmaeeli et al. (2020) reported a substantially higher proportion of severe symptoms [9]. However, much of the existing research has focused on specific clinical units, such as intensive care or emergency departments, or on particular crisis periods, including the COVID-19 pandemic. Fewer studies have examined nurses across different hospital wards while simultaneously considering occupational characteristics such as overtime hours, employment type, and job rank. Investigating these factors may provide a more detailed understanding of the occupational context associated with post-traumatic stress symptoms among nurses. PTSD-related symptoms among nurses may affect not only individual well-being but also occupational functioning and healthcare organizations, potentially contributing to burnout, absenteeism, reduced work performance, and difficulties with workforce retention [11, 12].

Therefore, the present study aimed to estimate the proportion of nurses screening positive for probable PTSD, describe the distribution of PTSD-related symptom clusters, and examine demographic and occupational factors associated with PCL-5 symptom scores among nurses working in selected hospitals affiliated with Birjand University of Medical Sciences, Iran, in 2024.

Methods

Study Design

This was a descriptive-analytical cross-sectional study.

Participants

The study population consisted of nurses employed in the teaching hospitals affiliated with Birjand University of Medical Sciences in 2024. The participating hospitals included Vali-e-Asr, Razi, and Imam Reza hospitals in Birjand, and Shohada Hospital in Qaen. Birjand and Qaen are two cities in South Khorasan Province, Iran. The study was conducted among nurses working in these selected hospitals to assess PTSD-related symptoms and associated demographic and occupational factors.

Inclusion and Exclusion Criteria

Inclusion criteria comprised holding at least an associate degree in nursing, having a minimum of three months of clinical work experience, fluency in Persian, and absence of hearing or speech impairments. Exclusion criteria included a self-reported or documented history of psychiatric disorders, current use of psychotropic medications, and experience of a severe non-work-related

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stressful event within the month preceding the study.

Sampling was conducted using nonprobability convenience sampling. Researchers visited each participating hospital during morning and evening shifts over 4 weeks (October–November 2024). Eligible nurses were identified through ward rosters and invited to participate individually during break times after the study objectives had been explained to them. Written informed consent was obtained before questionnaire distribution. Questionnaires were completed in a private room adjacent to each ward to ensure confidentiality. The average completion time was 15–20 minutes. Completed questionnaires were collected in sealed envelopes and stored securely.

Sample Size

The sample size was estimated using the standard formula for a single population proportion, based on the PTSD prevalence of 19.9% reported by Hamed et al. [13]. Assuming a 95% confidence level (Z = 1.96) and a margin of error of approximately 5.8%, the required sample size was approximately 180 participants. Allowing for a 10% potential non-response rate, the target sample size was set at approximately 200 nurses. A total of 200 eligible nurses were included in the study.

Data sources/measurement

Data were gathered using two questionnaires:

1.Researcher-developed Demographic and Occupational Information Form: Included age, gender, marital status, education level, ward type, work experience, overtime hours, employment type, job rank, economic status, and medical history. Job rank was categorized according to the official classification system of the Iranian Ministry of Health and Medical Education, which includes Nurse Aide, Assistant Nurse, Registered Nurse, and Head Nurse within the nursing hierarchy.

2.PTSD Checklist for DSM-5 (PCL-5): The PTSD Checklist for DSM-5 (PCL-5) is a standardized 20-item self-report measure assessing PTSD-related symptoms across four symptom clusters: Cluster B, Intrusion symptoms (5 items); Cluster C, Avoidance (2 items); Cluster D, Negative alterations in cognition and mood (7 items); and Cluster E, Alterations in arousal and reactivity (6 items). Each item is scored on a 5-point Likert scale ranging from 0 (Not at all) to 4 (Extremely), yielding a total score ranging from 0 to 80. In the present study, a total score of ≥35 was used as the threshold for a positive screening result for probable PTSD. The PCL-5 was used as a screening measure and was not considered a substitute for a structured clinical diagnostic interview. The Persian version has demonstrated acceptable psychometric properties, with satisfactory reliability and a factor structure supported by confirmatory factor analysis [14]. In the present sample, the internal consistency of the PCL-5 was acceptable (Cronbach's α=0.87).

Statistical Analysis

Data were analyzed using IBM SPSS Statistics (version 24). The Kolmogorov–Smirnov test was used to assess the normality of continuous variables. Descriptive statistics were reported as mean and standard deviation (SD) for continuous variables and frequency and percentage for categorical variables. The chi-square test was used to examine associations between categorical variables, while the independent-samples t-test and one-way analysis of variance (ANOVA) were used to compare continuous variables between groups, as appropriate. Spearman's correlation coefficient was used to assess associations between continuous variables when appropriate. For statistically significant overall group comparisons, Games–Howell post-hoc tests were performed for pairwise comparisons, taking into account unequal group sizes and variances. Statistical significance was set at $P < 0.05$.

Results

A total of 200 nurses participated in the study. The mean age of the participants was 32.64 ± 6.40 years (range: 23–51). The majority were female (n=148, 74.0%), married (n=167, 83.5%), and held a Bachelor's degree (n=171, 85.5%). The mean work experience was 8.73 ± 5.84 years. The most common ward assignment was general wards (n=101, 50.5%). Regarding employment type, 61 nurses (30.5%) were permanently employed, 58 (29.0%) had temporary contracts, 51 (25.5%) had tenured contracts, and 30 (15.0%) had fixed-term contracts. The mean monthly overtime was 45.04 ± 20.80 hours. The demographic and occupational characteristics of the participants are presented in Table 1.

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Table 1. Demographic and Occupational Characteristics of the Studied Nurses (n=200)

Variable	Subgroup	Frequency (n)	Percentage (%)
Gender	Female	148	74.0
	Male	52	26.0
Marital Status	Single	33	16.5
	Married	167	83.5
Education Level	Associate Degree	13	6.5
	Bachelor's Degree	171	85.5
	Master's Degree	16	8.0
Employment Type	Temporary Contract	58	29.0
	Fixed-Term Contract	30	15.0
	Tenured Contract	51	25.5
	Permanent	61	30.5
Ward Type	General Wards	101	50.5
	Specialty Wards (ICU/CCU/NICU)	52	26.0
	Emergency Department	47	23.5
Job Rank	Nurse Aide	10	5.0
	Assistant Nurse	37	18.5
	Registered Nurse	151	75.5
	Head Nurse	2	1.0

Overall PCL-5 Screening Results and Symptom Profile

The mean total PCL-5 score was 31.54 ± 12.30 (range: 0–80). Using a threshold of ≥35, 81 of the 200 nurses (40.5%; 95% CI: 33.7%–47.3%) had a positive screening result for probable PTSD. Because the PCL-5 is a self-report screening instrument, this proportion should not be interpreted as the prevalence of clinically diagnosed PTSD. The mean scores for the four PCL-5 symptom clusters were 8.08±3.54 for intrusion symptoms (Cluster B), 3.27±2.18 for avoidance (Cluster C), 10.78±5.20 for negative alterations in cognition and mood (Cluster D), and 9.42±4.93 for alterations in arousal and reactivity (Cluster E). The mean scores for the four DSM-5 symptom clusters are presented in Table 2.

Table 2. PCL-5 Total and DSM-5 Symptom Cluster Scores Among Nurses (n=200)

PCL-5 Symptom Cluster	Score Range	Mean ± SD
Cluster B: Intrusion symptoms	0–20	8.08 ± 3.54
Cluster C: Avoidance	0–8	3.27 ± 2.18
Cluster D: Negative alterations in cognition and mood	0–28	10.78 ± 5.20
Cluster E: Alterations in arousal and reactivity	0–24	9.42 ± 4.93
Total PCL-5 score	0–80	31.54 ± 12.30

Univariate Analysis of Demographic and Occupational Factors Associated with PCL-5 Scores

There was no statistically significant difference in mean PCL-5 scores according to gender (P=0.714), marital status (P=0.209), educational level (P=0.926), or ward type (P=0.209). Similarly, age (Spearman's ρ=-0.023, P=0.746) and years of work experience (Spearman's ρ=-0.004, P=0.960) were not significantly correlated with PCL-5 scores. These findings are summarized in Table 3.

Mean PCL-5 scores differed significantly across job-rank categories in the overall one-way ANOVA (F (3,196) =3.31, P=0.021). However, Games–Howell post-hoc comparisons showed that no individual pairwise comparison was statistically significant after adjustment (all P>0.05). The small number of head nurses (n=2) should be considered when interpreting the overall finding. Monthly overtime hours showed a weak positive correlation with PCL-5 scores (Spearman's ρ=0.148, P=0.037). Given the cross-sectional design, this association should not be interpreted as evidence of a causal relationship.

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Table 3. Univariate Analysis of Demographic and Occupational Factors Associated with PCL-5 Scores (n=200)

Variable	Category	Mean PCL-5 ± SD	Test Statistic	P-value
Gender	Male	31.00 ± 12.08	t=-0.37	0.714
	Female	31.73 ± 12.41		
Marital Status	Single	34.00 ± 14.34	t=1.26	0.209
	Married	31.05 ± 11.84		
Education Level	Associate Degree	32.62 ± 12.75	F(2,197)=0.08	0.926
	Bachelor's Degree	31.53 ± 12.44		
	Master's Degree	30.81 ± 11.02		
Ward Type	General Wards	32.46 ± 11.77	F(2,197)=1.58	0.209
	Specialty Wards	32.27 ± 10.19		
	Emergency Department	28.77 ± 15.08		
Job Rank	Nurse Aide	37.20 ± 10.01	F(3,196)=3.31	0.021
	Assistant Nurse	27.97 ± 9.69		
	Registered Nurse	32.27 ± 12.70		
	Head Nurse	14.50 ± 13.44		
City	Birjand	31.46 ± 11.40	t=-0.24	0.807
	Qaen	32.13 ± 18.08		

Association Between Gender and Positive PCL-5 Screening Result

The proportion of nurses with a positive PCL-5 screening result was 38.5% among male nurses and 41.2% among female nurses. The difference was not statistically significant (χ^2=0.034, P=0.854). These findings are summarized in Table 4.

Table 4. Association Between Gender and Positive PCL-5 Screening Result (Cutoff ≥35)

Gender	Positive Screening n (%)	Negative Screening n (%)	Total	χ^2	P-value
Male	20 (38.5)	32 (61.5)	52 (100)	0.034	0.854
Female	61 (41.2)	87 (58.8)	148 (100)		
Total	81 (40.5)	119 (59.5)	200 (100)		

Discussion

This study aimed to estimate the proportion of nurses with a positive screening result for probable PTSD and to examine demographic and occupational factors associated with PCL-5 scores among nurses working in selected teaching hospitals affiliated with Birjand University of Medical Sciences. In this study, 40.5% of nurses had a positive screening result for probable PTSD based on a PCL-5 score of ≥35, and the mean total score was 31.54 ± 12.30. This finding indicates a substantial burden of PTSD-related symptoms among the participating nurses. The observed proportion is higher than some estimates reported among healthcare workers in previous studies. For example, a study in the USA reported severe PTSD symptoms in approximately 35% of nurses [10], whereas research among healthcare workers in Greece reported a rate of 70.5% [15]. Studies among Iranian nurses have also demonstrated considerable variation in PTSD-related symptoms [16], while Li et al. reported a high prevalence of 81.0% among ICU nurses in China [17]. Previous qualitative research has also documented the lived experience of post-traumatic stress among emergency nurses, highlighting the occupational and emotional burden associated with repeated exposure to critical clinical events [18]. These differences may reflect variation in study populations, occupational settings, exposure to traumatic events, measurement instruments, and cutoff thresholds. Nevertheless, the relatively high proportion of positive screening results observed in the present study suggests that PTSD-related symptoms represent an important occupational mental health concern among nurses in the participating hospitals.

The variation in PTSD-related estimates across studies may partly reflect differences in the type and intensity of occupational stressors experienced by healthcare workers. Nurses may be repeatedly exposed to patient deterioration, death, severe illness, emotionally distressing situations, and

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workplace violence, with the psychological impact potentially influenced by workload, staffing conditions, organizational support, and opportunities for recovery [19]. The relatively high level of symptoms observed in the present study may therefore reflect the cumulative psychological burden associated with repeated occupational stressors rather than exposure to a single traumatic event. This interpretation is consistent with previous research showing substantial PTSD-related symptom burdens among nurses and other healthcare workers exposed to demanding clinical environments [10,15,16,17,18]. However, the specific occupational exposures underlying these symptoms were not directly measured in the present study.

The distribution of PCL-5 symptom clusters provides further insight into the nature of the reported symptom burden. In the present study, the highest mean scores were observed for Cluster D, negative alterations in cognition and mood (10.78 ± 5.20), and Cluster E, alterations in arousal and reactivity (9.42 ± 4.93), followed by Cluster B, intrusion symptoms (8.08 ± 3.54), and Cluster C, avoidance (3.27 ± 2.18). The relatively higher scores in the cognition/mood and arousal/reactivity domains suggest that negative emotional states, sleep-related difficulties, irritability, and heightened reactivity may constitute important components of the psychological burden experienced by these nurses. Sleep disturbances may be particularly relevant to psychological well-being, given evidence linking insomnia with subsequent mental health problems [20]. Previous research among healthcare workers has similarly identified prominent stress-related and arousal symptoms in occupationally demanding clinical settings [19,21]. Persistent sleep disturbance, irritability, and emotional distress may also interfere with concentration and occupational functioning, although patient-safety outcomes were not directly assessed in this study [22]. Monthly overtime hours showed a weak positive correlation with PCL-5 scores (Spearman's ρ=0.148, P=0.037). Although the magnitude of this association was modest, it suggests that nurses with greater monthly overtime tended to report higher levels of PTSD-related symptoms. Longer working hours may reduce opportunities for rest and psychological recovery and may increase fatigue when nurses are repeatedly exposed to stressful clinical situations. Similar concerns regarding workload and psychological well-being have been reported among healthcare workers working in high-demand clinical environments [16,17,23]. However, the weak correlation indicates that overtime alone is unlikely to account for the variability in PCL-5 scores, and other individual and organizational factors are likely to contribute. Given the cross-sectional design, this association should not be interpreted as a causal relationship.

Mean PCL-5 scores differed significantly across job-rank categories in the overall one-way ANOVA ($F(3,196)=3.31$, P=0.021). However, Games–Howell post-hoc comparisons showed that none of the individual pairwise comparisons was statistically significant after adjustment (all P>0.05). Therefore, the overall ANOVA finding should be interpreted as evidence of variation across job-rank categories rather than evidence that any specific job rank has a higher level of PTSD-related symptoms. Differences in clinical responsibilities, workload, patient contact, and perceived control over work may contribute to variation in psychological stress across occupational roles. The very small number of head nurses (n=2) further limits the precision of subgroup comparisons, and these possible occupational explanations should be examined in larger studies. The absence of statistically significant associations between PCL-5 scores and gender, marital status, educational level, ward type, age, or work experience warrants careful interpretation. Regarding gender, the lack of a significant difference is consistent with findings reported by Hosseininejad et al. among Iranian emergency nurses [8]. One possible explanation is that nurses working in similar clinical environments may experience comparable occupational stressors regardless of gender. Likewise, the absence of significant associations with age and work experience may suggest that current working conditions and recent occupational exposures could be more relevant to PTSD-related symptoms than demographic characteristics or career duration. This interpretation is consistent with the multifactorial nature of occupational mental health, in which workload, organizational environment, social support, and exposure to stressful clinical events may interact with individual characteristics [24]. However, non-significant findings should not be interpreted as evidence that these factors have no relationship with PTSD-related symptoms.

Taken together, the findings suggest that PTSD-related symptoms among nurses should be considered within the broader context of

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occupational conditions rather than as an outcome determined by a single demographic characteristic. The association with overtime and the variation observed across job-rank categories highlight the potential relevance of workload, work organization, and occupational role in nurses' psychological well-being. From an occupational health perspective, these findings support the value of organizational approaches that address excessive workload, opportunities for recovery, and access to psychological support. Such approaches may be particularly relevant in clinical environments where nurses are repeatedly exposed to distressing patient events and high work demands.

An important consideration in interpreting these findings is the nature of the PCL-5 as a screening instrument. The 40.5% figure represents the proportion of nurses who met the study threshold for a positive screening result for probable PTSD and should not be interpreted as the prevalence of clinically diagnosed PTSD. The PCL-5 is a self-report measure, and the optimal cutoff may vary according to the population and purpose of assessment [25]. Therefore, the present findings should be understood as indicating a substantial level of PTSD-related symptomatology rather than confirmed clinical diagnoses. Future studies using structured diagnostic interviews, such as the CAPS-5, could provide a more definitive estimate of clinically diagnosed PTSD among nurses.

This study has several limitations. First, its cross-sectional design prevents determination of temporal or causal relationships between occupational factors and PTSD-related symptoms. Second, convenience sampling may have introduced selection bias and limits the generalizability of the findings beyond the participating hospitals. Third, the PCL-5 is a self-report screening instrument and is not a substitute for a structured clinical interview; therefore, the screening-positive proportion should not be interpreted as the prevalence of clinically diagnosed PTSD. Self-reported responses may also be affected by recall or response bias. In addition, detailed information on some potentially relevant factors, including specific occupational trauma exposures, night-shift frequency, social support, and previous non-occupational trauma, was not collected and may have resulted in residual confounding. Finally, some occupational subgroups, particularly head nurses (n=2), contained very few participants, limiting the precision of subgroup comparisons. Larger multicenter studies using probability sampling and structured clinical interviews are needed to improve the precision and generalizability of future estimates.

Conclusions

In this study, 40.5% of nurses had a positive screening result for probable PTSD based on the PCL-5 threshold of ≥35, indicating a substantial burden of PTSD-related symptoms among the participating nurses. Monthly overtime hours showed a weak positive correlation with PCL-5 scores, while mean scores differed across job-rank categories in the overall analysis, although no individual pairwise comparison was statistically significant after adjustment. No significant associations were observed between PCL-5 scores and gender, marital status, educational level, ward type, age, or work experience. These findings highlight the importance of considering occupational workload and work-related conditions when addressing nurses' psychological well-being. However, because the study used convenience sampling and a self-report screening instrument within a cross-sectional design, the findings should not be interpreted as estimates of clinically diagnosed PTSD or as evidence of causal relationships. Further studies using representative sampling and structured clinical interviews are warranted.

Ethics Approval and Consent to Participate.

The study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Ethical approval was obtained from the relevant institutional review board of Birjand University of Medical Sciences (IRB code: IR.BUMS.REC.1403.223). All participants were fully informed about the purpose of the study, assured of confidentiality, and provided written informed consent prior to participation. Participation was voluntary, and participants were allowed to withdraw at any stage without any consequences.

Consent for Publication

Not applicable.

Data Availability Statement

The datasets used during the current study are available from the corresponding author on request.

Funding Statement

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Authors' Contribution

Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work: SMM, AM, AH, AHR; Drafting the work or revising it critically for important intellectual content: SMM, AM, AH, AHR; Final approval of the version to be published: SMM, AM; Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved: SMM, AM, AH, AHR.

Conflict of Interest

The authors declare that they have no conflicts of interest related to this study.

Declaration of Generative Artificial Intelligence (AI) in Scientific Writing

ChatGPT version 5.2 was used to improve the English grammar of the work.

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