

Analysis of the Relationship between Occupational Stress, Sleep Status and Mental Discomfort of Nurses in the Intensive Care Unit: A Cross-sectional Study

Riyu Chen^{a*}, Chunmei Guo^{b*}, Xiangrong Lin^c, Shunai Wu^d, Chunyan Zhou^e, Li Li^f

Abstract

The aim of this study was to explore the relationship between occupational stress, sleep status and mental discomfort of nurses in the intensive care unit (ICU). 58 eligible ICU nurses were regarded as the research objects according to our pre-defined inclusion criteria. Collected data included the demographics of those ICU nurses, their occupational stress scale, their physiological discomfort perception, and their sleep schedule and quality. We used the SPSS version 22 to implement for regression and correlation analyses. Based on our analysis, there was a significant correlation between the total score of occupational stress of nurses and the scores of Pittsburgh Sleep index ($r = 0.33$, $p = 0.02$). In addition, the occupational stress score was significantly associated with physiological discomfort perception scale ($r = 0.50$, $P < 0.013$). Additionally, career planning prospect and working atmosphere were negatively affected by occupational stress level, sleep quality and mental and psychological discomfort. However, the explanations for these association varied at a rate of 12.5% among questioned nurses. Therefore, there is a certain correlation between workplace stress and sleep status, mental and psychological discomfort in ICU departments. Combined with the current work pressure of ICU nurses, it is necessary to take care of the sleep status and release negative emotions, so ICU nurses could cope with their tiring and demanding job.

Keywords: Intensive care unit; Nurses' occupational stress; Sleep status; Mental and psychological discomfort; Correlation

Introduction

Based on a Chinese survey performed in 2018, the ratio of doctors to nurses in major hospitals was 1 to 1.04 [1]. On the other hand, in some Asian countries, this ratio was 1 to 2.1, which indirectly indicates that the relative number of nurses in china is relatively low and the gap is as high as 3.3 million [2]. Unfortunately, the shortage and lack of nurses bring great difficulties and challenges to the clinical work. Besides, as China's aging population becomes increasing, the demand for nurses in health care systems also increases proportionally [3]. Similarly, the relatively low number of nurses, who are supposed to perform physically and mentally demanding medical services, indirectly increases their occupational stress along with their physical and mental health [4]. The intensive care unit

(ICU) is a highly specialized department with patients whose status being critical and demand continuous follow up and careful care for their condition. Shortage in the number of nurses would result in having a negative impact on the psychological wellbeing of ICU nurses [5]. As clinical care becomes more intense, a nurse's occupational pressure will gradually evolve into the contradiction of professional service. In addition, occupational pressure will alter the quality of sleep and mental discomfort of nurses [6]. Moreover, nurses are affected by stress experiences, low quality sleep and mental health which prevent them from implementing scientific, standardized care medical services, and reduce their quality of life [7]. Many studies in the literature have investigated the relationship between occupational stress and sleep status, mental and psychological discomfort of nurses. However, only a few reports have studied the effect of nurses' occupational stress on their sleep status and mental and psychological discomfort. This study aimed to study the correlation between the occupational stress, sleep status and mental and psychological discomfort of nurses in three ICU departments. In this cross-

^aDepartment of Interventional Radiology, Hainan General Hospital/Hainan an Affiliated Hospital of Hainan Medical University, Haikou 570100, China

^{b,c,e}Pediatric Outpatient and Emergency Department, Hainan General Hospital/Hainan an Affiliated Hospital of Hainan Medical University, Haikou 570100, China

^dNeurosurgery ICU, Hainan General Hospital/Hainan an Affiliated Hospital of Hainan Medical University, Haikou 570100, China

^fXiuvina Pediatric District 1, Hainan General Hospital/Hainan an Affiliated Hospital of Hainan Medical University, Haikou 570100, China

*Contributed equally to the manuscript as first authors (Riyu Chen, Chunmei Guo)

sectional study, we aimed to provide guidance for senior managers in order to formulate ICU nurse management and humanistic care strategies [8-9].

2. Materials and Methods

2.1 Research questionnaires and scales

2.1.1 ICU nurse basic information questionnaire

This questionnaire was formulated by the hospital nursing staff, and after pre-research and confidence test, in line with the research attributes of the questionnaire, the purpose is to carry out a comprehensive analysis of the basic contents of the research nurses.

2.1.2 A measure of nurse's occupational stress

This scale of nurse's occupational stress contains 5 dimensions, with a total of 38 entries. The 5 dimensions included in this scale relate to work atmosphere, social association, attitude of family escorts and patients, ICU nursing skills proficiency level, and career planning prospects. The questions in this scale were scored using a 4-point assessment scale. The total score of the questionnaire ranged from 0 to 114 points where the minimum score was zero and the maximum score was 152. The higher the score, the stronger the work pressure a nurse is currently facing on this scale.

2.1.3 Physiological discomfort perception assessment scale

This scale included a total of 90 items with 10 dimensions, including physiological symptom perception, compulsive symptoms, social association, fear, tension, hostility, fear, persistence, mental symptoms, in addition to other factors. Each entry is subject to a standard score of 1 to 5 points and the total score on the overall scale ranges from 0 to 355 points. The higher the score a nurse can receive on this scale, the more physical discomfort she is experiencing. The lower the score on this scale, the more obvious the patient's supposed psychopathy. That's because the physiological symptom perception factor is considered as the main negative factor affecting the sleep quality of nurses.

2.1.4 The Pittsburgh Sleep Quality Index (PSQI)

This scale intended to assess the sleep status of ICU nurses in our survey. It is an internationally recognized sleep evaluation scale with relatively high sensitivity and specificity levels. The PSQI can evaluate the nurse's current sleep quality in the previous 30 days. The total score on this scale is between 0 and 21 points. The higher the nurse's sleep index, the worse the sleep quality she experiences.

2.2 Research process

Our survey was conducted on ICU nurses who met our pre-defined inclusion requirements. Guidance for this survey was provided by the hospital nursing department and the research unit in hospitals where the questionnaire was taken. Each hospital included in this survey was responsible for the distribution of questionnaires and scales as well as docking with the lead unit. Each nurse was required to independently complete the assessment of the questionnaire and scale, guided by an experienced person.

2.3 Statistical analysis

The Statistical Package for the Social Sciences (SPSS), version 22, was used to analyze variables in this study. Correlation among variables was described as mean and standard deviation (SD) using Pearson correlation analysis methods. A P-value of less than 0.05 was considered as statistically significant.

Additionally, we used multiple regression analyses to investigate the relation between sleep status, as a dependent variable, and occupational stress and mental discomfort, as independent variables. Result of the regression analysis among those variables was described as beta (B) and standard error (SE). We considered that there was a positive relation when the P value of the test was less than 0.05.

3. Result

3.1 Demographics and baseline characteristics

This survey was carried out in ICU departments in three hospitals in Haikou, China. 58 ICU nurses were selected as study subjects according to the preset inclusion requirements. Questionnaires were distributed to those nurses and then were collected by special personnel. Interestingly, the response rate was 100% while participation in this questionnaire was voluntary. All the subjects were females, and the age range was between 24 and 52 years old, with an average age of 36.1 years. Among those nurses, 22 nurses were unmarried, 30 nurses were married, and 6 nurses were divorced. In addition, 33 nurses were undergraduates and 25 nurses were junior college graduates. The distribution of professional titles is as follows: senior professional title (deputy chief nurse, chief nurse) in 6 nurses, intermediate title (supervisor nurse) in 28 nurses, and junior title (nurse) in 24 nurses.

3.2 Correlation Analysis of Occupational stress, Sleep status and Mental and Psychological discomfort of ICU Nurses

There was a significant correlation between the total score of occupational stress of nurses and the scores of Pittsburgh Sleep index ($r=0.33$, $p=0.02$).

In addition, the occupational stress score was significantly associated with physiological discomfort perception scale ($r=0.50$, $P<0.013$); (Table 1).

Table 1. Correlation Analysis of Occupational stress, Sleep status and Mental and Psychological comfort of ICU Nurses (r value)

Subject	X±s	1	2	3	4	5	6	7	8
Pittsburgh sleep index	7.95±1.13	1							
Working atmosphere	1.56±0.42	0.33*	1						
Social relevance	1.19±0.60	0.27*	0.71*	1					
Attitude of family caretakers and patients	1.59±0.61	0.30*	0.73*	0.71*	1				
ICU nursing skill mastery level	1.36±0.60	0.26*	0.69*	0.73*	0.65*	1			
Career planning prospect	1.89±0.67	0.29*	0.69*	0.53*	0.47*	0.49*	1		
Career planning prospect	1.49±0.59	0.33*	0.90*	0.87*	0.86*	0.73*	0.71*	1	
Career planning prospect	1.59±0.41	0.44*	0.40*	0.40*	0.38*	0.29*	0.47*	0.49*	1

Note: * $P<0.05$

3.3 Multiple regression Analysis of Occupational stress and Mental discomfort on Sleep status of ICU Nurses

To carry out clinical path calculation, the five-dimensional stress source factors in the nurse occupational stress scale were regarded as variables, the Pittsburgh sleep index factors were regarded as dependent variables, and mental and psychological discomfort were regarded as intermediate variables.

In the first step, we regarded the five-dimensional stress source factors in the nurse occupational stress scale as predictive factors and the Pittsburgh sleep index as a dependent variable to carry out multiple regression analysis. The results showed that the regression coefficients

of career planning prospects, work atmosphere and other factors are statistically significant. However, the common explanation variation rate was 12.5%. In addition, the five dimensions of nurses' occupational stress were taken as predictive variables and the perceptual evaluation of physiological discomfort as dependent variables for multiple regression analysis. Our results showed that the working atmosphere and physiological discomfort perception were regarded as predictive variables. We used the Pittsburgh sleep index as a dependent variable for multiple regression analysis, where physiological discomfort perception and career planning prospect were significantly correlated. The variation in common explanation variation was 23.2% (Table 2).

Table 2. Multiple regression Analysis of Occupational stress and Mental comfort on Sleep status of ICU Nurses

Dependent variable	Predictive variable	B	SE	Beta	t	P	95%CI
Pittsburgh sleep index	Constant	4.583	0.364		11.983	0.001	3.827~5.579
	Working atmosphere	0.981	0.265	0.168	2.463	0.007*	0.238~1.624
	Social relevance	0.187	0.293	0.039	0.627	0.539	0.392~0.791
	Attitude of family caretakers and patients	0.089	0.264	0.020	0.343	0.703	0.464~0.661
	ICU nursing skill mastery level	0.196	0.275	0.039	0.689	0.708	0.358~0.784
	Career planning prospect	0.494	0.246	0.107	2.117	0.030*	0.037~1.036
Perceptual evaluation of physiological discomfort	Constant	60.684	4.895		11.982	0.001	50.791~70.132
	Career planning prospect	16.253	4.869	0.209	3.194	0.001*	7.427~26.002
	Social relevance	7.013	3.835	0.128	1.671	0.058	0.719~12.069
	Attitude of family caretakers and patients	5.127	3.462	0.117	1.984	0.031*	0.296~12.231
	ICU nursing skill mastery level	7.563	3.175	0.139	1.843	0.036*	0.406~13.135
	Career planning prospect	-1.069	3.152	-0.001	-0.296	0.562	-0.795~5.130
Pittsburgh sleep index	Constant	2.752	0.395		7.296	0.001	2.163~3.576
	Working atmosphere	0.489	0.312	0.079	1.314	0.141	-0.179~1.334
	Social relevance	0	0.269	0	-0.001	0.873	-0.546~0.603
	Social relevance	-0.039	0.257	-0.006	-0.142	0.769	-0.567~0.494
	ICU nursing skill mastery level	-0.009	0.263	-0.001	-0.038	0.947	-0.543~0.529
	Career planning prospect	0.577	0.239	0.116	2.378	0.014*	0.104~1.039
	Perceptual evaluation of physiological discomfort	0.023	0.002	0.368	9.527	0.001*	0.019~0.028

Note: * $P<0.05$

3.4 Multiple regression Analysis of Occupational stress and Sleep status on Mental and Psychological discomfort of ICU Nurses

The five dimensions of the occupational stress scale were taken as predictive variables, the physiological discomfort perception scale as dependent variables, and the Pittsburgh sleep index as mediating variables for clinical path analysis. In the first step, the five dimensions of the occupational stress scale were taken as predictive variables and the physiological discomfort perception scale as dependent variables for multiple regression analysis. Our results showed

that the regression coefficients of nurses' working atmosphere and career planning prospects were statistically significant and the common explanatory variable reached 11.8%. In addition, the five dimensions of the occupational stress scale and the Pittsburgh sleep index were taken as predictive variables and the perception of physiological discomfort as dependent variables for multiple regression analysis. The analysis showed that the regression coefficients of the Pittsburgh sleep index and work atmosphere were statistically significant, and the common explanation variation rate was 30.6% (Table 3).

Table 3. Multiple regression analysis of nurses' work stress source and sleep quality on mental and psychological pleasure

Dependent variable	Predictive variable	B	SE	Beta	t	P	95%CI
Pittsburgh sleep index	Constant	61.783	4.950		11.567	0.001	51.768~71.079
	Working atmosphere	16.457	4.976	0.219	3.510	0.001*	8.134~26.321
	Working atmosphere	7.136	4.018	0.106	1.774	0.072	-0.713~14.804
	Attitude of family caretakers and patients	5.340	0.279	0.021	0.350	0.714	0.475~0.673
	ICU nursing skill mastery level	8.053	3.814	0.106	1.774	0.072	0.416~14.853
	Career planning prospect	-1.241	3.417	-0.018	-0.351	0.068	-8.132~5.481
Pittsburgh sleep index	Constant	4.732	0.379		11.978	0.001	3.836~5.368
	Working atmosphere	1.035	0.379	0.179	2.516	0.008*	0.251~1.637
	Social relevance	0.202	0.307	0.039	0.344	0.612	-0.405~0.803
	Attitude of family caretakers and patients	0.104	0.287	0.021	0.352	0.712	-0.472~0.689
	ICU nursing skill mastery level	0.215	0.287	0.041	0.712	0.416	0.417~13.246
	Career planning prospect	0.512	0.215	0.112	2.114	0.037	-0.043~1.059
Perceptual evaluation of physiological discomfort	Constant	38.562	5.156		7.410	0.001	29.642~51.578
	Working atmosphere	12.785	4.512	0.156	2.842	0.005*	3.813~21.481
	Social relevance	6.206	3.689	0.087	1.603	0.095	-1.124~12.831
	Attitude of family caretakers and patients	4.725	3.521	0.069	1.295	0.176	-2.354~11.145
	ICU nursing skill mastery level	7.054	3.587	0.107	1.832	0.049	-0.069~13.172
	Career planning prospect	-3.816	3.192	-0.042	-1.237	0.216	-9.532~2.271
	Pittsburgh sleep index	4.620	0.421	0.318	8.321	0.001*	3.751~4.625

Note: *P<0.05

4. Discussion and Conclusions

The purpose of this study was to analyze the correlation between occupational stress, mental discomfort, sleep status, and mental and psychological discomfort of ICU nurses. It is established in the literature that the more obvious the occupational stress felt by nurses, the worse their perceived mental and psychological discomfort is, and the worse their sleep status is [10]. Our results showed that there was a positive correlation between nurses' occupational stress and mental discomfort and sleep status. According to the Hong Kong United Hospital Association, if a nurse feels more occupational stress, her negative emotional state would be high as 40% [11]. The probability of nurses causing negative events, such as sleep disorders, is as high as 70%. Therefore, the

more obvious the stress load is borne by ICU nurses in actual work, the more attention should be paid to the multidimensional management of their sleep quality and negative emotions. This should be done to those nurses in order to ensure that they provide quality clinical care for their patients [12].

This survey further analyzed the influencing factors of occupational stress of ICU nurses and found that occupational stress was related to patients' current perceived sleep status and mental and psychological discomfort. Besides, the correlation analysis of various sub-dimensions of occupational stress led to finding that there were three occupational stress dimensions related to mental and psychological discomfort and sleep quality in the five dimensions of occupational stress. In addition, the working atmosphere of nurses in

ICU has a certain correlation with their perceived mental and psychological discomfort. Surely, the mental and psychological discomfort of ICU nurses would have a negative impact on nurses' sleep status [13].

The career prospect planning of nurses is related to the promotion of their professional titles in the future. Therefore, out of worry about the future, it will indirectly affect their sleep status while depriving patients of necessary medical care [14]. In a Chinese survey, nurses' occupational stress was related to their current sleep status and mental and psychological discomfort, and there is a relatively responsible relationship among them [15]. According to the feedback received from a similar survey, ICU nurses' self-cognitive concept, self-identity, individual perceived social support, coping with work psychology can effectively improve nurses' current mental and psychological discomfort [16]. Therefore, by guiding nurses to implement continuous cognitive management, nurses' sleep status is beneficial in reducing their occupational stress levels [17, 18].

Some literature shows that there is a significant correlation between nurses' negative emotional status caused by occupational stress and the hypothalamic-pituitary-adrenal axis. Nurses' occupational stress and serotonin receptor genotype are the key factors leading to nurses' poor sleep status. The interaction of the above-mentioned factors will adversely affect the sleep status of nurses [19].

At present, there have been a number of clinical studies which investigated the correlation between negative emotional status and sleep status at home and abroad. In the process of follow-up of clinical investigation and analysis, it is necessary to further analyze the correlation between nurses' mental and psychological discomfort and sleep status [20-21].

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Conflict of interest

The authors declare no conflict of interest

Ethics statement: This study was approved by the Hainan general hospital ethics committee. Personal data of the participants are kept confidential and informed consent was obtained from the participants.

Availability of data and materials:

All authors confirm that the data and material are available

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