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Original Article

A Study of Turnover Factors and Occupational Stress among Nursing Staff at a Medical Center

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Purpose: A low percentage of licensed nurses are employed and there is high nurse turnover in Taiwan. We aimed to investigate the impact of turnover factors and occupational stress among clinical nursing staff in Taiwan, to help medical managers identify occupational stress and turnover factors, reduce occupational pressure, improve the working environment, and ultimately prevent the loss of professional nurses, reduce expenditure, and improve the quality of nursing care.
Methods: A cross-sectional quantitative study was conducted using a questionnaire to investigate the exit factors and occupational stress among nursing staff leaving a medical center between January and December, 2017. Scales were used to measure workload, job autonomy, nurse-patient relationships, team relationships, occupational hazard exposure, and violence hazard exposure. Overall, 126 questionnaires were administered; 123 were recovered (recovery rate, 97.6%). Data was analyzed via descriptive statistics, t-tests, variance analysis, Scheffe's post-hoc analysis, and Pearson's correlation analysis.
Result: Job characteristics was the major turnover factor and positively, significantly correlated with other turnover factors. The impacts of interpersonal interaction, and organizational and environmental factors were significantly higher in critical care nurses than nurses in general wards (p<.01). Workload was the highest occupational stress, followed by job autonomy, exposure to occupational hazards, nurse-patient relationships, team relationships, and exposure to violence. Critical care nurses reported higher stress from nurse-patient relationships and team relationships than nurses in general wards (p<.05).
Conclusion: A positive working environment is essential to reduce nurses' workload. Provision of sufficient support and care, strengthening violence prevention and management, and care and simulation training via cross-disciplinary cooperation are recommended to reduce occupational stress resulting from poor communication and thus stabilize nursing manpower.

Keywords: Nursing, occupational stress, turnover factor

1. Introduction

According to statistics from the Taiwan Union of Nurses Association (TUNA), the percentage of licensed nurses employed in Taiwan dropped from 60.1% in 2009 to 59.2% in May, 2020; much lower than the rates in Canada and the United States (93.6% and 83.2%, respectively). Xiong and Zhang (2015) reported the average tenure of a nurse was 7.7 years, which reflects the low employment rate and high turnover rate of nursing staff in Taiwan. In turn, these factors significantly impact the quality of

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nursing care, as they increase abnormal events, and may increase patient mortality due to the elevated nurse-patient ratio (1.2). Therefore, it is imperative to identify the factors associated with turnover before we can stabilize the nursing manpower. The rapid aging of the population, transition to the National Health Insurance payment system, rise in the awareness of patient safety, and the fact that more and more people pay attention to medical quality challenge the professionalism of nurses today, and there are upward global trends towards increased work stress (3.4). A large number of studies in different countries have demonstrated correlations between work stress and turnover intention among nurses. For example, high levels of occupational stress have been linked to stronger turnover intention (5), and turnover intention correlates significantly with the susceptibility to stress and frequency of feeling stressed (6). Thus, in order to identify relevant countermeasures to improve the stability of the nursing workforce in the future, this study focused on the occupation stress experienced by nurses resigning from a medical center in Taiwan.

2. Literature Review

2.1. Current status and impact of resignation of nursing staff

Many problems have been reported in the working environment of nursing staff in Taiwan, such as (1) heavy workload, (2) wage disproportionate to responsibility, (3) limited professionalism to establish peer relationships with physicians, and (4) low job satisfaction and retention intention (7). The turnover rate of new nursing staff within three months is between 30.2% and 66.7%, and the first-year turnover rate is close to 60%[8]. Compared to values of over 20 years in Hong Kong, Macau, Singapore, Malaysia, Thailand, and Indonesia, the average nurse job tenure is much shorter in Taiwan, i.e., 7.7 years (1.3). The engagement of the Ministry of Health and Welfare (MOHW) in Taiwan in nursing reform and manpower supply reduced the turnover rate from 10.5% in 2015 to 9.4% in 2017 (8). However, the high rate of nurse resignations in Taiwan may be the result of distinct factors compared to other countries, thus clarification and resolution of these factors are essential.

A high turnover rate inevitably leads to insufficient nursing manpower, which in turn results in unstable workforce quality, heavier workload, wastage of social resources, low staff morale, and makes it difficult to ensure patient safety and quality of care. Previous nursing workforce studies revealed significant correlations between nursing shortages and poor patient outcomes, as indicated by the rates of urinary tract infection, nosocomial pneumonia, deep vein thrombosis/pulmonary embolism, upper gastrointestinal bleeding, sepsis, shock/cardiac arrest, postoperative complications, longer length of stay, and high failure-to-rescue ratio (10), etc. Excessive nurse workload or inexperience can increase the risk of human errors, such as medication errors, delayed ventilator weaning, elevated failure-to-rescue frequency, and higher patient mortality (10). Thus, excessive turnover of nursing staff has huge impacts on both nursing manpower and the quality of care.

2.2. Factors related to resignation of nursing staff

Previous studies have shown that nurse turnover is between 12% and 34% in Taiwan, and is higher among nurses who are under thirty-years-old, single, and who have been working in a hospital for three years or more. Personal factors, the impact of three-shift work on health, external attractions, and poor working conditions are all major factors that contribute to nurse resignation. Moreover, nurse turnover could be significantly predicted by age, marital status, and job tenure (11). A study investigating the factors related to the turnover of clinical nursing staff in 100 hospitals in Taiwan revealed 64.3% of nurses had intention to resign; a much higher ratio than in Europe and other Asian countries. The major factors associated with intention to resign were conflicts between work and family, salary, and whether the wage is proportional to the workload. Nursing staff in intensive care units (ICUs) had stronger intention to resign than nurses in surgical wards and operating rooms, and clinical nurses' turnover intention could be predicted by their health status, working overtime, age, and working in ICU (12). High resignation intention among clinical nurses was also related to job exhaustion, which could be the result of three-shift work, taking care of patients directly, management of critically ill patients in a short period of time, facing the patients' and their families' demands, and the challenges of patient safety

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and medical quality. The factors associated with nurse resignation intention included age, educational attainment, seniority, the nature of the ward, marital status, number of children, and job satisfaction (12). Nurses working in medical wards, surgical wards, ICUs, and those working irregular shifts experience heavier work stress and have stronger intention to quit; the common reasons mentioned were work overload, excess physical demands, and being unable to take care of their family. Significant differences were found among nursing staff in different units in terms of work stress, depression, and intention to quit. Nurses who are married or were inexperienced in medical wards reported greater work stress and depression, which lead to stronger resignation intention[5]. Lower nursing retention intention was also previously associated with higher self-conceived occupational hazard exposure and heavier work pressure[13].

2.3. Related occupational stress among nursing staff

Occupational stress is the discrepancy between the demands of the work environment and the work performed by the individual, and strongly influences workers' physiological and psychological balance. When an individual is unable to fulfill the demands of their job, the result could be detrimental to the health and well-being of the individual (American Psychological Association), as well as the quality of service and the institution. The "job characteristics" of nursing are highly stressful and involve providing a professional service to clients. A study of occupational stress in hospitals across Taiwan showed that up to 35.1% of nursing staff experienced a high level of stress. Being unable to take charge of decision-making for patient care and overloading lead to diminished job satisfaction and negative responses, which can be deleterious to physical and mental health and increase the intention to resign. Taken together, occupational stress due to excessive workload and a lack of mastery in the workplace affect nurses' physical and mental health, and are key to resignation intention (2.14.15). Occupational stress among nursing staff can be related to (1) being on the front line of medical service due to confronting the unreasonable demands of patients and their families, (2) feeling bewildered by physicians' disrespectful behavior or vague patient management, (3) poor interactions with colleagues, and (4) facing uncontrollable workplace hazards, such as occupational hazards and violence (14). Therefore, investigation of the factors that contribute to nurses leaving and the occupation stress experienced by resigned nurses is crucial to health affairs.

Taken together, occupational stress among nurses originates from (1) workload: heavy work, numerous daily tasks, large amounts of paperwork; (2) professional autonomy: being unable to assess and perform nursing actions for patient care; (3) nurse-patient relationships: unreasonable demands from patients and their families; (4) team relationships: poor relationships and communication with colleagues in the same and other units; (5) uncontrollable exposure to occupational hazards; and (6) uncontrollable exposure to violence[2,14,15]. Thus, this study aimed to investigate the relationships between nursing turnover factors and occupational stress above among resigned nurses.

3. Methods

3.1. Research design and subjects

The present cross-sectional study used a structured questionnaire that targeted departing nursing staff at a medical center in central Taiwan between January 1, 2017, and December 31, 2017. The purpose, methods, and process of the study and protection of the participants' privacy were explained to the subjects by the investigator when each departing nurse was processed at the nursing department. After agreeing to voluntarily participate in the study and providing informed consent, the departing nursing staff completed the survey individually in a separate interview room and then returned the survey to the nursing department. Those who did not wish to complete the questionnaire could refuse to participate in the study, and the participants could choose to withdraw from the study at any time.

A total of 126 questionnaires were distributed, and 123 questionnaires were collected, with a recovery rate of 97.6%. The inclusion criteria for the study were (1) licensed practical nurses or registered nurses with a qualifying license (2) who had been practicing clinical nursing in the hospital for at least

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three months at their time of departure. The exclusion criteria were new nursing staff who left the hospital within three months of recruitment. This study was approved by the IRB of the medical center (CSMUH No. CS17030).

3.2. Methods

The structured questionnaire was developed based on a literature review, clinical experience, the clinical nurse career traits stress scale, and the job content scale from the Institute of Labor, Occupational Safety and Health, Ministry of Labor (MOL)[16]. The questionnaire included the following content: (1) six items of basic information, i.e., gender, age, marital status, number of children, job tenure, shifts (fixed day shift, fixed night shift, three shifts); (2) 60 items of turnover factors, i.e., ten items on personal and family factors, five items on salary and welfare, 12 items on job characteristics, six items on interpersonal interaction, five items on development and further study, 11 items on the organization, 11 items on the environment. A five-point scale was employed; higher scores indicate the factor contributes more strongly to resignation. "Query for turnover factors of incoming recently graduated nursing employee" developed by Chang *et al*. (2010) was adopted to characterize the turnover factors among the nursing staff in this study. The importance CVI was above .86; reliability was measured using the internal consistency test and Cronbach's α was .97. (3) The clinical nurse occupational stress scale, which includes 138 items encompassing workload, job autonomy, pressure from nurse-patient relationships, pressure from team relationships, exposure to occupational hazards, and exposure to violence. A five-point scale was adopted; higher scores indicate more pressure.

Statistical power was analyzed by G power; based on a power of 80%, two-tailed test with α = .05, explanatory power R^2 = .13 (moderate), the estimated sample size required was 92. A total of 126 questionnaires were administered, and 123 were recovered (recovery rate 97.6%). We adopted the clinical nurse occupational stress scale, which was developed in a study of the practice environment and physical and mental health of nurses in Taiwan (2014) (16), The content validity index for scales (S-CVI) was higher than 0.8, as judged by expert validity. After modification and deletion of items, the score of each item was above 3 points, and the total CVI was 0.81. For the "clinical nurse occupational stress scale", Cronbach's α for nurse-patient relationships, team relationships, exposure to occupational hazards, and exposure to violence were 0.85, 0.86, 0.89, and 0.86, respectively, indicating good validity and reliability[16].

3.3. Data analysis

The results were analyzed with SPSS 20.0, and presented as percentages, or means and standard deviations. Data was compared using *t*-tests, analysis of variance (ANOVA), Scheffe's post-comparative analysis, and the Pearson correlation test.

4. Results

4.1. Basic information

A total of 123 valid questionnaires were recovered from resigned nurses; 95.9% of the nurses were female (n = 118) and 4.1% were male (n = 5). The nurses ranged in age from 20 to 64 years (average, 29.9 ± 6.34-years-old), 62% were under 30, and 68.3% were unmarried (n = 84). Most participants did not have children (78.9%, n = 97). Average seniority at the time of resignation was 6.9 ± 6.1 years and the majority of participants worked on a three-shift rotation (60.1%, n = 74; Table 1).

4.2. Analysis of factors related to nursing staff turnover

Based on the average levels of agreement (percentages), "job characteristics" (63.3%) ranked first among the nursing turnover factors, followed by "salary and welfare" (59.4%), "family factors" (37.5%), "development and further study" (36.2%), "environmental factors" (33.2%), "interpersonal interactions" (31.6%), and "organizational factors" (29.9%; Table 1). The five most significant "job characteristic" turnover factors were excessive uncontrollable factors in caring for patients in clinical practice (74.0%); heavy workload and clinical responsibilities (72.4%); the three-shift work pattern (70.5%); too much paperwork (69.1%), and too many patients to take care of (69.1%).

The items with greater than 69% agreement in the "salary and welfare" category were "too few

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Table 1. Demographic characteristics

		(N=123)
Variable	Number (percentage)	Average±SD
Gender		
Female	118 (95.9)	
Male	5 (4.1)	
Age		29.9 ± 6.34
Marriage		
No	84 (68.3)	
Yes	39 (31.7)	
Child		
No	97 (78.9)	
Yes	26 (21.1)	
Average seniority		6.9 ± 6.1
Shift		
Fixed day shift	33 (26.8)	
Fixed night shift	16 (13)	
Three-shift rotation	74 (60.1)	
Turnover factors	Level of consent (%)	Average±SD
Job characteristics	63.3	3.1 ± 10.34
Salary and welfare	59.4	3 ± 4.66
Family factors	37.5	2.4 ± 5.16
Development and further study	36.2	2.3 ± 3.99
Environmental factors	33.2	2.2 ± 6.87
Interpersonal interaction	31.6	2.1 ± 4.98
Organizational factors	29.9	2 ± 8.57
	Level of consent (>69%)	Average±SD
Job characteristics		
Excessive uncontrollable factors in taking patients in clinical practice	74	3.34 ± 1.11
Heavy workload and clinical responsibilities	72.4	3.16 ± 1.1
Three-shift work pattern	70.5	3.12 ± 1.09
Too much paperwork	69.1	3.1 ± 1.07
Too many patients to take care of	69.1	3.11 ± 1.11
Salary and welfare		
Too few bonuses and allowances in addition to regular pay	73.2	3.19 ± 1.19
Wage disproportional to responsibility	69.2	3.11 ± 1.15
Family factors		
Worsening physical condition	73.5	3.29 ± 1.19
Having to take care of family members	69	3.08 ± 1.34

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Table 2. Pearson's correlation analysis of demographic variables and nursing staff turnover factors

(N=123)

	Age	Number of children	Family factors	Salary and welfare	Job characteristics	Interpersonal interaction	Development and further study	Organizational factors	Environmental factors
Age	1								
Number of children	.537**	1							
Family factors	-0.068	0.038	1						
Salary and welfare	-0.085	-.200*	.214*	1					
Job characteristics	-0.022	-.231*	.273**	.720**	1				
Interpersonal interaction	-0.112	-.266**	.230*	.529**	.526**	1			
Development and further study	0.055	-0.107	.203*	.605**	.671**	.644*	1		
Organizational factors	0.014	-0.123	.265**	.538**	.554**	.811*	.759*	1	
Environmental factors	-0.128	-.202*	.266**	.513**	.599**	.614*	.576*	.620*	1

*p<.05, **p <.01, ***p <.001

Table 3. Pearson's correlation analysis of occupational stress

(N=123)

Variable	Percentage of consent (%)	Mean	SD	Workload	Job autonomy	Nurse-patient relationship	Team relationship	Exposure to occupationnal hazards	Violence
Workload	79.3	26.24	4.07	1					
Job autonomy	70.7	25.88	4.07	.431**	1				
Nurse-patient relationship	58.0	24.82	4.07	.615**	-.510**	1	.		
Team relationship	55.0	22.15	4.58	.355**	-.462**	811*	1		
Exposure to occupational hazards	63.3	25.18	4.28	.441**	-.344**	.502*	.514*	1	
Violence	52.4	21.87	4.21	.361**	-.429**	.615*	.337*	.362*	1

*p<.05, **p <.01, ***p <.001

bonuses and allowances in addition to regular pay" (73.2%) and "wage disproportional to responsibility" (69.2%), and, in the "family factors" category, "worsening physical condition" (73.5%) and "having to take care of family members" (69.0%; Table 1).

Pearson's (p < .01) correlation analysis revealed a negative correlation between the resigned staff having children and interpersonal relationships in the workplace. Participants without children had poorer interpersonal relationships than those with

Table 4. Variance analysis of turnover factors and occupational stress among departing nurses ***(N = 123)***

		Salary and welfare		Job characteristics		Interpersonal interaction		Development and further study		Organizational		Environmental	
Variable	**n**	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***
Ward type			0.05		0.647		<.001***		0.005**		0.001**		0.006**
General ward	53	14 (4.7)		35.2 (11.3)		11.5 (4.8)		11.5 (4.2)		22.4 (8.5)		23 (6.7)	
ICU	44	16.1 (4.4)		36.7 (9.0)		15.5 (4.8)		13.4 (3.6)		28.5 (8.1)		27.1 (6.6)	
Others	26	13.9 (4.7)		34.4 (10.5)		12.7 (4)		10.4 (3.6)		22.2 (7.2)		22.9 (6.7)	
Residence			0.198		0.008**		0.169		0.316		0.482		0.091
North	12	14.8 (3.4)		36 (8.3)		16.8 (6.3)		13.3 (3.8)		27.8 (8.3)		26.3 (5.9)	
Central	92	14.8 (5)		34.8 (10.5)		13.3 (5.1)		11.9 (4.4)		25 (9.5)		24.3 (7.2)	
South	19	15.6 (3.3)		42.5 (8.9)		14.6 (4)		12.7 (2.1)		25.4 (5.6)		28.4 (4.1)	

		Workload		Job autonomy		Exposure to occupational hazards		Nurse-patient relationship		Team relationship		Violence	
Variable	**n**	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***	**M±SD**	***t/F***
Ward type			0.393	0	0.035*		0.201		0.039*		0.016*		0.861
General ward	53	23.9 (2.4)		39.7 (3.8)		22.3 (4.6)		23.4 (8.2)		22.4 (8.1)		23 (6.7)	
ICU	44	24.5 (2.4)		38.8 (3.3)		21.2 (4.1)		29 (8.2)		30.5 (8.2)		27.1 (6.6)	
Others	26	2.9 (0.4)		37.2 (5.3)		20.3 (3.8)		22.2 (6.9)		20.2 (7.2)		22.9 (6.7)	
Residence			0.733		0.126		0.014*		0.758		0.855		0.221
North	13	24.8 (2.5)		40.5 (5.3)		25.7 (4.6)		22.4 (8.2)		22.4 (8.1)		23.2 (3.4)	
Central	106	24.2 (2.5)		38.6 (3.9)		21.9 (4.1)		28.5 (8)		23.6 (8.2)		28.3 (3.2)	
South	4	24.3 (3.3)		41.5 (2.1)		19 (3.8)		22 (7.1)		20.2 (7.2)		24.2 (2.3)	

*p<.05, **p <.01, ***p <.001

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children. Job characteristics was positively correlated with family factors, salary and welfare, interpersonal relationships, development and further study, organizational factors, and environmental factors. Unsatisfactory job characteristics had negative effects on other turnover factors. Family factors correlated positively with job characteristics, organizational factors, and environmental factors, but was not related to salary and welfare, interpersonal relationships, or development and further study (Table 2).

Variance analysis of the turnover factors related to the type of ward and place of residence of the resigned nursing staff indicated significant correlations between the type of ward and interpersonal interactions, development and further study, organizational factors, and environmental factors ($p < .01$). Significant correlations were also observed between the place of residence and job characteristics ($p < .01$), as shown in Table 4.

Scheffe's post-hoc analysis revealed that team relationships, organizational factors, and environmental factors were more significantly associated with turnover among nurses in working ICU than nurses in general wards. Compared to all other wards, development and further study was significantly correlated with turnover among nurses working in ICU. Scheffe's post-hoc analysis also revealed that living in Southern Taiwan was correlated with significantly higher turnover than living in central Taiwan, suggesting the place of residence has a significant influence on job characteristics, as resigned nursing staff who live in Southern Taiwan may have a higher intention to leave (Table 5).

4.3. Analysis of occupational stress among resigned nursing staff

Workload (79.3%) was the most frequent occupational stress reported by the resigning nurses, followed by job autonomy (70.7%), exposure to occupational hazards (63.3%), stress from nurse-patient relationships (58.0%), stress from team relationships (55.0%), and exposure to violence (52.4%). Pearson's correlation analysis revealed that workload positively and significantly correlated with job autonomy, nurse-patient relationships, team relationships, exposure to occupational hazards, and exposure to violence ($p < .01$). Moreover, job autonomy correlated negatively with nurse-patient relationships, team relationships, exposure to occupational hazards, and exposure to violence. Workload had the highest impact on score, followed by job autonomy, exposure to occupational stress, stress from nurse-patient relationships, stress from team relationships, and exposure to violence (Table 3).

The nurses reported high frequencies of workload stress related to needing to focus for a long time (96.7%, $n = 119$) and their workload resulting in physical exhaustion (90.2%, $n = 111$). In terms of job autonomy, 99.2% ($n = 122$) of nursing staff agreed that continued on-the-job training to cope with various situations in patient care improved autonomy, and 91.1% ($n = 112$) of nurses agreed that receiving appropriate help and support to maintain a patient situation under control when they encountered difficulties they could not manage themselves improved autonomy. (3) With respect to exposure to occupational hazards, the highest agreements were obtained for having to move patients or objects (82.9%, $n = 102$), followed by being unable to ensure whether patients have infectious diseases (76.4%, $n = 94$). The most frequent stress related to nurse-patient relationships was being unable to communicate with the patients in real time about their condition due to insufficient communication from the medical team (79.7%, $n = 98$), followed by disrespectful words or emotional stress from physicians (73.2%, $n = 90$). The most frequently reported team relationship stressor was having to face negative emotions from patients and their families (87.8%, $n = 108$), followed by patients' families or caregivers not being able to take responsibility for the daily care of the patients (70.7%, $n = 87$). As for violence in the workplace, the most frequent stressor was verbal abuse (78.9%, $n = 97$), followed by psychological violence (65.0%, $n = 80$).

Variance analysis of occupational stress related to the type of ward and educational attainment among the resigned nursing staff indicated significant associations between the type of ward and job autonomy, nurse-patient relationships, and team relationships ($p < .05$). Significant differences were also observed between educational attainment and exposure to occupational hazards ($p < .05$; Table 4). Scheffe's post-hoc analysis of occupational stresses revealed the impact of job autonomy was significantly

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Table 5. ANOVA and post hoc tests for significant turnover factors and occupational stress

(N=123)

Grade/Variable	N	Mean ± SD	F	P-Value	Scheffes
Interpersonal interaction				<.001***	
Ward type			8.721		(2)>(1)
(1) General ward	53	11.5 ± 4.8			
(2) ICU	44	15.5 ± 4.9			
(3) Others	26	12.7 ± 4			
Development and further study				0.005**	
Ward type			5.531		(2)>(3)
(1) General ward	53	11.5 ± 4.2			
(2) ICU	44	13.4 ± 3.6			
(3) Others	26	10.4 ± 3.6			
Organizational factors				0.001**	
Ward type			7.993		(2)>(1)
(1) General ward	53	22.4 ± 8.5			
(2) ICU	44	28.5 ± 8.1			
(3) Others	26	22.2 ± 7.2			
Environmental factors				0.006**	
Ward type			5.274		(2)>(1)
(1) General ward	53	23 ± 6.7			
(2) ICU	44	27.1 ± 6.6			
(3) Others	26	22.9 ± 6.7			
Job characteristics			4.136		
Residence				0.008**	(3)>(2)
(1) North	10	36 ± 8.3			
(2) Central	92	34.8 ± 10.5			
(3) South	19	42.5 ± 8.9			
Job autonomy				0.035*	(1)>(2)
Ward type			5.267		
(1) General ward	53	39.7 ± 3.8	3.8		
(2) ICU	44	38.8 ± 3.3	3.3		
(3) Others	26	37.2 ± 5.3	5.3		
Nurse-patient relationship				0.039*	
Ward type					(2)>(1)

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(1) General ward	53	23.4 ± 8.2	8.2		
(2) ICU	44	29 ± 8.2	8.2		
(3) Others	26	22.2 ± 6.9	6.9		
Team relationship				0.016*	
Ward type			7.665		(2)>(1)
(1) General ward	53				
(2) ICU	44				
(3) Others	26				
Exposure to occupational hazards				0.014*	
Education level					(1)>(2)
(1) Junior college	13	25.7 ± 4.6	4.6		
(2) University	106	21.9 ± 4.1	4.1		
(3) Master	4	19 ± 3.8	3.8		

*p<.05, **p <.01, ***p <.001

stronger for nurses working on general wards than on ICUs, whereas nurse-patient relationships and team relationships more significantly affected nurses in ICUs than in general wards. Scheffe's post-hoc analysis of exposure to occupational hazards revealed higher stress among nurses educated to junior college level than those with Bachelor's degrees, suggesting education considerably influences stress derived from exposure to occupational hazards (Table 5).

5. Conclusion

The specific aim of this study was to investigate the turnover factors and occupational stress among nursing staff who resign from a medical center in Taiwan. Based on the percentages of agreement, "job characteristics" was the major turnover factor, followed by "salary and welfare" and "family factors". Furthermore, Pearson's correlation analysis of the "job characteristics" revealed positive correlations with family factors, salary and welfare, interpersonal relationships, development and further study, organization factors, and environmental factors, which suggests negative interactions occur between poor job characteristics and other turnover factors. Therefore, improving the job characteristics might ameliorate the negative effects of other turnover factors. Pearson's correlation analysis of "family factors" revealed strong positive correlations between turnover and job characteristics, organizational factors, and environmental factors, and weak correlations with salary and welfare, interpersonal relationships, and development and further study. These results suggest that resigning nursing staff consider the impact of family factors more important than those of salary and welfare, interpersonal relationships, and development and further study. Taken together, job characteristics in combination with family factors are the major turnover factors among resigning nursing staff. Therefore, understanding the "job characteristics" of nursing remains an important topic.

A literature review revealed that the job characteristics were related to "workload" and "job autonomy", which in turn affected occupational stress (2.14.15). Further analysis of our questionnaire data showed that the highest agreements were achieved for excessive uncontrollable factors in clinical patient care, heavy workload and clinical responsibilities, and three-shift work, consistent with reviews of the literature (17.18). "Salary and welfare" was the second leading turnover factor, which is consistent with the fact that 49.18% of clinical nurses in Taiwan were unsatisfied with their current salary, and 70% had intention to resign[3]. Similarly, Zhang *et al*. (2014)

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reported that the level of salary directly affected the work attitude of employees. Therefore, pay-for-performance is a prerequisite for satisfactory work outcomes; otherwise, the employees may quit and seek a better position[19]. However, an in-depth analysis of the "family factors" among resigned nurses revealed worsening physical condition and having to take care of family members were the main turnover factors. Overall, this study concludes that excessive workload, three-shift work, exorbitant physical demands, being unable to take care of family, and salary are the main turnover factors, consistent with previous studies (3.5.20).

As our study identified that "job characteristics" is an important turnover factor, further analyses of workload and job autonomy in the job characteristics category and their relationships with other turnover factors were carried out. Pearson's correlation test indicated "workload" was positively and significantly correlated with job autonomy, nurse-patient relationships, team relationships, exposure to occupational hazards, and exposure to violence ($p < .01$), and "job autonomy" correlated negatively with nurse-patient relationships, team relationships, exposure to occupational hazards, and exposure to violence. However, in-depth analysis revealed that job autonomy improved to 99.2% ($n = 122$) among nursing staff who received continued on-the-job training to cope with various situations in patient care, and was 91.1% ($n = 112$) among nurses who received appropriate help and support if they encountered difficulties controlling patient situations that they cannot manage by themselves. Both of these observations suggest that even though the hospital has taken related measures to improve job autonomy, and these actions have been recognized by the resigning nurses, other turnover factors in the "job characteristics" category still led to high (74.0%) agreement on "too many uncontrollable factors in patient care in clinical practice". Moreover, job characteristics was positively correlated with "workload", and nurses chose to leave due to occupational stress derived from their heavy workload and other factors, even if they were professionally trained to have high job autonomy. This result is consistent with a survey carried out by the MOL, which found that the detrimental effects of a heavy workload on physical condition was the major turnover factor, as 84.5% of resigned nurses experienced occupational stress due to their heavy workload and quit because of physical or mental health conditions[16]. Moreover, a previous report stated that job characteristics, highly stressful work, and physical and psychological exhaustion were major turnover factors (17). Therefore, strategies to improve the heavy loading characteristics of the nursing job remain an crucial issue.

We found stress derived from exposure to occupational hazards was significantly higher among the participants educated to junior college level than those educated to university level. This is consistent with a study by Chiang and Chant (year), who found that nursing staff educated to junior college level were less mature, had lower perceived competence in professional knowledge and techniques, and felt under greater stress at work[21]. Nursing staff may encounter occupational stress when facing an uncontrollable work environment or exposed to hazardous or violent threats. In this study, the highest agreement for stress due to exposure to occupational hazards was related to moving patients, consistent with the analysis of exposure to occupational hazards by the MOL (2014) (16). The second most common source of occupational hazard stress was being unable to ensure whether a patient has an infectious disease, in agreement with Lin *et al.* (2011)(14). For instance, nurses are at risk of becoming infected when taking care of patients with infectious or suspected emerging infectious diseases. Furthermore, occupational stress could also come from the risk of touching extravasated drugs during administration of chemotherapy, or the risk of exposure to radiation when taking X-rays of bedridden patients in the ward.

In terms of the nurse-patient relationship, nurses suffer stress derived from insufficient communication within the medical team—which renders the nursing personnel unable to pass on messages about the patient's condition—and disrespectful treatment by physicians. Regarding the stresses created by the team relationship, the most frequent stress was related to having to face negative emotions from patients and their families. These findings are consistent with Lin *et al.* (2011), who reported clinical nurses frequently have to face unreasonable demands from patients and

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their families, and experience poor communication with colleagues in the same or different units (11).

We found that verbal abuse was the most frequent violence-related occupational stress, in line with a previous finding that 56.6% of nurses had suffered verbal abuse, mainly from patients or their families, in the workplace within the last year (22). Workplace violence may result in stress, depression, fatigue, and poor sleep among nurses, which in turn may negatively affect the quality of care and patient safety, reduce nurses' passion for work, and increase the turnover rate.

Turnover factors related to interpersonal relationships, organizational factors, and environmental factors were significantly higher among nursing staff working in ICUs than in general wards, as well as factors related to development and further study. These observations may be due to the job characteristics in ICU, i.e., emergencies and severely ill patients, as nurses in ICUs may find it more difficult to feel respect from patients and are under greater stress. This is compatible with previous studies that found the characteristics of the job unit significantly affect turnover, and nursing staff in ICUs and nurses working unfixed shifts reported heavier work stress and had stronger intentions to quit[5]. Similarly, another study showed the significant and positive effect of perceived occupational hazards and retention intention on occupational stress among nursing staff in ICUs (23). Stress from job autonomy may be higher among nurses in the general ward than ICUs, as the nursing staff in general wards require more independent thinking and judgment in clinical practice. Differences in the nature of the physicians on duty in the ward may also affect the occupational stress experienced by nurses with different job characteristics. In the general ward, nursing staff need to have higher job autonomy to fulfill the high demands of personal development, and must be able manage patients' situations independently until the doctor-on-duty attends. As a unique finding of this study, we propose that nurses in general wards experience greater occupational stress resulting from job autonomy than nurses in ICUs; even though they receive similar stimulatory and challenging training in the hospital, there is a higher demand for independent thinking, autonomy, and creativity among clinical nurses in the general ward. In contrast, our ward-specific analysis showed that nursing staff in the ICU suffer greater stress from the nurse-patient and team relationships than nurses in the general ward. Similarly, nursing staff in ICUs were previously shown to have higher average work pressure scores[13], most likely due to dealing with more critical and complicated patient situations, and facing stronger emotional stress and negative emotions from patients, their families, and physicians, and could also experience stress caused by insufficient communication and unclear passing of messages in a limited time.

Suggestions and Limitations

Based on this study, we propose a number of recommendations. Firstly, to prevent nurse resignations due to the job characteristics of heavy workload, additional manpower such as care attendants, runners, and part-time workers should be employed to share non-professional tasks and allow the nursing staff to concentrate on professional nursing duties. Moreover, the number of front-line nursing personnel should be increased during busy hours, to reduce the workload, occupational stress, and, hence, intention to quit among nurses.

Secondly, a positive working environment should be provided for nursing staff. This could include sufficient tools for patient transfer, such as skateboards and lifts, and prevention of moving overweight patients. Administrators should also strengthen the protection and isolation measures for nursing staff to reduce exposure to occupational hazards. Moreover, the salary and welfare of nursing staff should be increased to attract outstanding nurses, such as providing spot, working unit, holiday, retention, long-term retention, signing bonuses, etc. A diversified welfare system could also be provided, such as subsidies for social activity, cross-team gathering, travel, seminars, and on-the-job training, as well as medication, childcare services or subsidies, meal allowances, free consultations, dormitories, transportation vehicles, and free parking. In addition, it is also possible to improve nurses' vitality and enthusiasm by providing more flexible working hours or fixed shifts (24.25).

Third, nursing administrators should improve

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violence prevention and management to eliminate fear. Fourth, as nursing staff face great stress due to insufficient professional ability and being unable to feel respect from patients in critical care units, we recommend supervisors must provide sufficient support and care, relief, and professional training courses to reduce the pressure among ICU nurses.

Fifth, root cause analysis has shown that poor communication accounts for more than 65% of medical safety events (26), which cause further tension among workers and place pressure on nurse-patient relationships. We suggest interdisciplinary cooperation for care and simulation training, and full discussion, feedback, cooperation, and improvement programs are required to eliminate the occupational stress derived from poor communication. Taken together, we hope our recommendations could help to reduce the turnover rate and stabilize nursing manpower, and thus improve the quality of clinical care. However, this cross-sectional study was based on completion of a structured questionnaire by resigning nursing staff at single medical center in Taiwan, and which may limit the ability to draw inferences for nursing staff in other cities or hospitals at different levels or with different attributes.

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