Effects of Marital Status and Shift Work on Family Function among Registered Nurses

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Abstract: This study aims to assess the interactive effect of marital status and shift work on family function. A population-based sample of 1,438 nurses between the ages of 20–45 yr was recruited from Taiwan during the period from July 2005 to April 2006 using a mailed questionnaire. The self-administered questionnaire contained information about demographic data, work status, shift work schedule, and the Family APGAR (Adaptation, Partnership, Growth, Affection, and Resolve) Scale, to evaluate family function. Compared to day shift nurses, non-night and rotation shift nurses had 1.53- and 1.38-fold (95% CI=1.09–2.14 and 1.01–1.88) risk to have poor family function after adjusting for other covariates. Married nurses, by contrast, had a 0.44-fold (95% CI=0.29–0.66) risk to have poor family function compared to single nurses. In addition, married nurses who worked non-night or rotation shifts had a significantly higher percent of poor family function than those married nurses working day shifts; however, similar results were not replicated in single nurses. We concluded that shift work and marital status could influence family function.

Introduction

Shift-work is broadly defined as a work period other than the normal period of 7:00 in the morning (AM) to 6:00 in the evening (PM)[1]. For example, applicants for employment in a hospital that must provide 24-h service to its patients are offered shift work. This kind of irregular

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work is a necessity in the workplace due to a globalized economy and increasing demands for services around-the-clock. Thus, shift work schedules are increasing worldwide, and many workers in industrialized nations are shift workers[2].

In the healthcare industry, ~25% of all those employed in hospitals work nontraditional hours[3], making this an important concern about their health[4]. Besides, the prevalence rate of occupational women has increased more than that for men, but they are still the major caregivers in their family in the modern society. Thus, to study the potential impact of shift-work on female employees within the healthcare industry continues to be crucial.

Shift work requires individuals to be awake during what is usually a period of behavioral inactivity when our circadian rhythms are preparing our bodies for sleep. Irregular sleeping hours can be detrimental to physical and mental health as well as disruptive to social and family obligations[5, 6]. Although the mean age of workers who perform shift work is relatively younger, irregular work schedules would still influence their life style, health, sleep, social and family interactive life. Many researchers have found that nurses who work rotation shifts complain of a variety of health discomforts such as sleep disturbance[6–9], increased stress, menstrual dysfunction[10], and psychiatric problems[11, 12]. Even long-term follow-up studies have suggested the association of shift work with the risk of malignancy (e.g., breast cancer) in nurses[13–15].

Besides the above adverse health effects, several studies have reported that shift work may interfere with family relationship[16–18]. Its mechanism is probably due to disruption of family routines and roles by limiting the amount of time that workers can spend with their families, and by placing them on a time schedule different from their families. Because of these disturbances, women working rotation shifts complained that they did not see their husbands enough, and that they experienced interference with their sexual relations. However, it is not determined whether or not these findings can be applicable to different marital statuses.

Several instruments have been applied to assess family function in clinical settings and communities[19, 20]. Among them, the APGAR (Adaptation, Partnership, Growth, Affection, and Resolve) Scale contains only five questions, which have been validated, and can be considered reliable to evaluate family function[21, 22]. Thus, we used this easy and simple scale tool to assess the impact of shift work on the intensity of work-family interference among the different marital statuses, including single and married nurses.

Our main hypotheses were that shift work can impair family function, and martial status can modify this effect.

Subjects and Methods

Study population

The detailed study design has been described elsewhere[23]. In brief, the potential study subjects were female and aged 20-to 45 yr-old registered nurses in the Kaohsiung City and County Nurses Association of Kaohsiung metropolitan area, including Kaohsiung city and county of southern Taiwan. Between July–October, 2005, 1,486 self-administered structured questionnaires were received, including 882 nurses in Kaohsiung city who gave consent to the study first and 456 (51.7%) responded, and 1,030 (14.4%) of the remaining 7,173 nurses signed informed consent forms and completed the questionnaires at the same time by mail. This study was approved by the Kaohsiung Nursing Association and Internal Review Board of Kaohsiung Medical University Hospital (KMUH-IRB-940068); all study subjects provided informed consent forms.

Measurement
Demographic variables

The questionnaire mainly contained demographic characteristics, working status, and Family APGAR Index. Demographic information included age, education levels, and years of employment. Information about whether they worked in a medical center and whether they received continuous education possibly related to the work-load, was also collected.

In Chinese culture, females are more responsible for family care even though they have their own jobs, so the variables of marital status and number of children might potentially confound the relationship between nursing work and family relationships. Thus, we also collected information about their current marital status, including being single (never married, divorced, or widowed) or married.

Shift schedule and shift work arrangement

Workplace and work schedule were evaluated by questionnaires and shift work was divided into three main different kinds of work schedule: day shift, non-night shift, and rotation shift. A non-night shift was defined as a shift ending before midnight. Rotation shift was defined as a work schedule that included the day shift (from 8:01 AM to 4:00 PM), evening shift (from 4:01 PM to 12:00 PM or

Table 1. Demographic characteristics by different work schedule among 1,438 study nurses

	Work schedule			
	Day shift	Non-night shift	Rotation shift	*p* value
	N=312	N=322	N=804	
	N (%)			
Age (yr)				<0.0001
20–29	68 (21.8)	190 (59.0)	542 (67.4)	
30–39	180 (57.7)	98 (30.4)	215 (26.7)	
≥40	54 (17.3)	28 (8.7)	22 (2.8)	
Missing	10 (3.2)	6 (1.9)	25 (3.1)	
Education levels				<0.0001
< College	138 (44.2)	267 (82.9)	514 (63.9)	
≥ College	174 (55.5)	53 (16.5)	288 (35.8)	
Missing	1 (0.3)	2 (0.6)	2 (0.3)	
Current marital status				<0.0001
Single	99 (31.7)	168 (52.2)	542 (67.4)	
Married	213 (68.3)	154 (47.8)	262 (32.6)	
Having children				<0.0001
No	122 (39.1)	175 (54.3)	564 (70.2)	
Yes	188 (60.3)	138 (42.9)	223 (27.7)	
Missing	2 (0.6)	9 (2.8)	17 (2.1)	
Years of employment				<0.0001
<2	10 (3.2)	31 (9.6)	176 (21.9)	
2–5	16 (5.1)	80 (24.8)	149 (18.5)	
5–10	83 (26.6)	101 (31.4)	285 (35.5)	
10–5	100 (32.1)	63 (19.6)	132 (16.4)	
≥15	103 (33.0)	47 (14.6)	61 (7.6)	
Missing	0 (0.0)	0 (0.0)	1 (0.1)	
Medical center				<0.0001
Yes	71 (22.8)	55 (17.1)	352 (43.8)	
No	241 (77.2)	266 (82.9)	452 (56.2)	
Continuous training				0.0363
No	243 (78.4)	268 (85.6)	642 (79.9)	
Yes	67 (21.6)	45 (14.4)	162 (20.1)	
Family function*				0.0022
Good	181 (58.0)	145 (45.0)	387 (48.1)	
Poor	131 (42.0)	177 (55.0)	417 (51.9)	

*Family function was evaluated by APGAR score (Adaptation, Partnership, Growth, Affection, and Resolve) (good >6; poor ≤6).

from 2:01 PM to 10:00 PM) and nightshift (from 12:01 AM to 8:00 AM).

Nurses who worked rotation shift were asked three further questions about their work schedule: 1. How frequently did your shift change in the last 2 months?; 2. How many days off did you receive when you switched from the night shift to other shifts; 3. In the last 2 months, how many night shifts did you work?

Family function

The Family APGAR Index was developed by Smilkstein to evaluate family function[21]. It consists of five items, dealing with degree of adaptation, partnership, growth, affection, and resolution in the family. Each item contained choices 0, 1 or 2, and the total scores ranged from 0 to 10. The Family APGAR Index was translated into Mandarin Chinese by Chen *et al.*[24, 25]. The scale of Family APGAR Index was validated by gold standard tool of the Pleaa-Satterwhite Family Function Index which showed the

correlation co-efficiency was 0.8[26, 27]. A cut-off score of 6 was used to distinguish between good (>6) and poor (≤6) family function[28, 29].

Statistical Analysis

The participants were categorized according to their work schedule by groups of day work, non-nightshift, and rotation shift. The demographic variables and the Family APGAR Index among these three groups were compared using χ^2 test or Fischer's exact test where appropriate. The significant variables, including age, education levels, years of employment, medical center (yes vs. no), having children (yes vs. no), and continuous education (yes vs. no) as well as marital status (single vs. married) in the univariate analyses, were placed into the multivariate logistic models to investigate the relationship between work schedule and family function by family APGAR scores. In addition, the relationships between work schedule and family function by family APGAR scores were separately examined in single or married nurses after adjusting for other covariates. Missing data in all covariates were treated as an additional category. The data were analyzed with the SAS statistical package, version 9.0. A value of two-sided $p<0.05$ was considered significant.

Results

After excluding questionnaires with no information about shift work or shift schedule (n=45) and lack of sufficient information to calculate the Family APGAR scores (n=3), the remaining 1,438 questionnaires were analyzed. There were 312 day shift nurses, 322 non-night shift nurses, and 804 rotating shift nurses (Table 1). There were 78.3% of them working as non-day shift and 55.9% requiring rotation shifts. Nurses in the groups of rotation shift or non-night shift were younger, less educated, mainly single, and fewer years of work experience than the day shift nurses. The percentage of nurses who worked in the medical center and did not have children were higher in the group of rotation shift than the other two groups. The percentage of poor family function score was higher in nurses with rotation shift or non-night shift than day shift nurses.

Compared to day shift nurses, non-night shift and rotation shift nurses had 1.53- and 1.38-fold (95% CI =1.09–2.14 and 1.01–1.88, respectively) risk to have poor family function after adjusting for other covariates (Table 2). Married nurses, by contrast, had a 0.44-fold (95% CI =

0.29–0.66) risk to have poor family function compared to single nurses after adjusting for other covariates.

Categorized by current marital status, we found that the percentages of poor family function in single nurses were 55.6% for day shift, 61.9% for non-night shift, and 54.2% for rotation shift, whereas the percentages of poor family function in married nurses were 35.7% for day shift, 47.4% for non-night shift, and 46.9% for rotation shift (Table 3). Married nurses who worked as non-night or rotation shift had a significantly higher percentage of poor family function than the married nurses with day shift after adjusting for other covariates (Table 3). In contrast, similar results were not found in the group of single nurses.

We further examined the effect of different shift activities, categorized by current marital status, on family function among 804 rotation shift nurses (Table 4). In general, different characters of shift work arrangement were not found to be significantly associated with family function scores among the total 804 rotation shift nurses or 542 rotation shift nurses who were single. However, among the 262 married nurses, we combined working as night shift in the 7–14 days and ≥15 days in the past 2 months and did find that working as rotation shift with seven overnight duties and over had a 1.95-fold (95% CI=1.16–3.28; p value=0.0132) risk to have poor family function than less than seven overnight duties.

Discussion

This study shows shift work (both non-night and rotation shift) among registered nurses can impair family function and current married nurses have better family function scores than do single nurses. In addition, day shift was the best work condition for family function among the married nurses, but not for the single ones, suggesting the modifying effect of marital status on the relationship between shift work and family function impairment.

A few studies have evaluated the relationship between different shift work and work-family conflict among nurses[30–33], and several research studies have discussed this issue in other occupational settings, such as steel manufacturing workers, flight attendants, and military police and professional workers[17, 18, 34–36]. Fujimoto *et al.* (2008) first investigated the impact of different shift work and work-family conflict among the 378 full-time female nurses who were mothers of preschool children in Japan. In general, they found that working night shifts did not have a significant effect on the conflict in balancing work and childcare. Subsequently, Šimunić & Gregov (2012)

Table 2. Relationship of family function to different work schedule and current marital status

	Family function*							
	Good	Poor						
	N (%)	N (%)	OR	95% CI	*p* value	AOR[+]	95% CI	*p* value
Work schedule								
Day	181 (58.0)	131 (42.0)	1			1		
Non-night	145 (45.0)	177 (55.0)	1.69	1.23–2.31	0.0011	1.53	1.09–2.14	0.014
Rotation	387 (48.1)	417 (51.9)	1.49	1.14–1.94	0.0031	1.38	1.01–1.88	0.0415
Current marital status								
Single	356 (44.0)	453 (56.0)	1			1		
Married	357 (56.8)	272 (43.2)	0.6	0.49–0.74	<0.0001	0.44	0.29–0.66	<0.0001

*Family function was evaluated by APGAR score (good >6; poor ≤6). [+]Adjusting for age, education levels, years of employment, continuous training, medical center, and having children.

Table 3. Relationship of family function to different work schedule categorized by current marital status

	Family function*					
Work schedule	Good	Poor				
	N (%)	N (%)	*p* value	AOR[+]	95% CI	*p* value
Single (N=809)			0.2175			
Day	44 (44.4)	55 (55.6)		1		
Non-night	64 (38.1)	104 (61.9)		1.24	0.71–2.15	0.4467
Rotation	248 (45.8)	294 (54.2)		1.01	0.62–1.66	0.9645
Married (N=629)			0.024			
Day	137 (64.3)	76 (35.7)		1		
Non-night	81 (52.6)	73 (47.4)		1.65	1.05–2.58	0.0293
Rotation	139 (53.1)	123 (46.9)		1.73	1.15–2.61	0.0089

*Family function was evaluated by APGAR score (good >6; poor ≤6). [+]Adjusting for the same covariates in Table 2.

conducted a Croatian study of 128 married nurses who all had children and found that nurses working rotation shift experienced higher conflict between work and family than did day shift nurses. However, these two studies did not have information about non-night shift; in addition, nurses who were single were not included. Furthermore, Yildirim *et al.* (2008) conducted a Turkey study of 243 nurses and found that irregular work schedules were a significant predictor of work-to-family conflict. This study put the marital status into the control variables but there was no special issue concerning that. Besides, they only categorized the work schedule into regular, partial regular and irregular schedules. Another Italian study of 664 nurses (Camerino *et al.* (2010)) assessed the work-family conflict among four work-schedule groups and found that different work schedules had different impacts on work-family conflict, but there was no exploration of the association

between marital status and work-family conflict. Thus, the interactive effect of marital status and shift work on work-family or work-child care conflict could not be elucidated. Because these studies, along with ours, used different instruments to evaluate work-family or work-childcare conflict and cultures of societies in different countries may have different impacts on the female role in the family, the issue of comparability across these studies is also doubtful among rotation-shift nurses.

A series of previous studies, including ours, have found that rotation shift, but not non-night shift, can significantly affect sleep quality and mental health among nurses[7–8, 37–39]. Interestingly, excluding rotation shift, non-night shift duty still has a negative impact on family function among married nurses; however, these significant findings are not present in nurses who were unmarried, divorced, or widowed. The probable explanation is: Many

Table 4. Relationship of family function to shift work arrangement among the 804 rotation shift nurses categorized by current marital status

	Good N (%)	Poor N (%)	p value	AOR[+]	95% CI	p value
Shift work arrangement						
Total (N=804)						
Period of shift change			0.6941			
<1 wk	247 (48.1)	267 (51.9)		1		
≥1 wk–<1 month	78 (46.2)	91 (53.8)		1.13	0.78–1.64	0.5119
≥1 month	60 (51.3)	57 (48.7)		0.9	0.57–1.43	0.6571
Days off after the last night shift			0.3146			0.4010
1 d	289 (47.1)	324 (52.9)		1		
>1 d	98 (51.3)	93 (48.7)		0.87	0.62–1.21	
Cumulative days of night shift in the 2 months						0.5330
≤6 d	149 (50.3)	147 (49.7)		1		
7–14 d	154 (48.3)	165 (51.7)		1.02	0.73–1.42	0.9253
≥15 d	82 (45.1)	100 (54.9)		1.19	0.81–1.75	0.3853
Single (N = 542)						
Period of shift change			0.3202			
<1 wk	161 (44.7)	199 (55.3)		1		
≥1 wk– <1 month	47(44.3)	59 (55.7)		1.05	0.66–1.66	0.851
≥1 month	40 (54.1)	34 (45.9)		0.61	0.35–1.07	0.0865
Days off after the last night shift			0.2807			0.3245
1 d	186 (44.5)	232 (55.5)		1		
>1 d	62 (50.0)	62 (50.0)	0.2807	0.81	0.54–1.23	
Cumulative days of night shift in the 2 months			0.3655			0.3245
≤6 d	161 (44.7)	199 (55.3)		1		
7–14 d	47 (44.3)	59 (55.7)		0.71	0.47–1.08	0.1106
≥15 d	40 (54.1)	34 (45.9)		0.95	0.60–1.50	0.8159
Married (N=262)						
Period of shift change			0.4539			
<1 wk	86 (55.8)	68 (44.2)		1		
≥1 wk– <1 month	91 (74.0)	32 (26.0)		1.42	0.73–2.74	0.2985
≥1 month	20 (46.5)	23 (53.5)		1.83	0.79–4.24	0.1557
Days off after the last night shift			0.8974			0.7837
1 d	103 (52.8)	92 (47.2)		1		
>1 d	36 (53.7)	31 (46.3)		0.92	0.50–1.68	
Cumulative days of night shift in the 2 months			0.0673			
≤6 d	78 (60.5)	51 (39.5)		1		
7–14 d[++]	40 (45.5)	48 (54.5)		2.01	1.12–3.59	0.0192
≥15 d[++]	19 (47.5)	21 (52.5)		1.81	0.84–3.93	0.1326

*Family function was evaluated by APGAR score (good >6; poor ≤6). [+]Adjusting for the same covariates in Table 2. [++]AOR=1.95-fold; 95% CI=1.16–3.28; p value=0.0132, when combined the groups of 7–14 d and ≥15 d and compared with ≤6 d.

family activities take place in the evening while non-night shift nurses are working, suggesting shift duties (both non-night and rotation shift) might particularly affect those with children and the need to take care of their families[40].

We also found that the percentages of poor family function in the three different shifts among the single nurses (54.2–61.9%) were consistently higher than those for married nurses (35.7–47.4%), suggesting married status still

provided a good support system despite female responsibilities in caring for a child and/or an elderly relative in the family. More researches should further explore why single nurses had fluctuating and/or unstable family function.

Several instruments have been used to assess family function[19, 20]. Two most commonly self-reported ones were the FACES III (Family Adaptation and Cohesion Evaluation Scales) and the Family APGAR Scale (Adaptation, Partnership, Growth, Affection, and Resolve)[21]. These two instruments have been validated and can be reliable. For the FACES III, the primary components contain the dimensions of cohesion, adaptability, and communication, which can effectively elucidate family functioning. However, this instrument contains more questions (20 items with 5-point Likert-type scale) than the Family APGAR Scale, which contains 5 items with 3-point Likert-type scale. Thus, in the field study, the APGAR Scale can be filled out easily in a short period of time (within 5 min). In addition, the Family APGAR Scale was translated into Mandarin Chinese by Chen *et al.*[25] and several studies have also authenticated its good validity as used in Taiwan[24, 25]. Thus, we used the Family APGAR Scale to evaluate family function in this study.

This is a population-based study, and the study nurses were from a variety of service places, for which our findings can be representative for those from the "real world". However, some limitations were still present in this study. First, the study was conducted during 2005, and the findings may not reflect the current situation. However, in order to supply 24-h health service to patients, the working system with rotation is still inevitable at present. Meanwhile, the health care demand in developing and developed countries is increasing. Thus, our findings still provide useful information for nurse leaders to arrange appropriate schedules for their nursing staff. Second, regarding the constitution of family members, our study questionnaire only collected information about the current marital status and the number of children in the family. Thus, the detailed information about the obligation of the study nurse was limited. Third, the study participants were registered nurses from the Kaohsiung City and County Nurses Association whose workplaces were widely spread, so the response rate was relatively low. Fourth, the majority of study nurses were Taiwanese. The family and social cultures in Asian countries are markedly different from those in Western countries. Thus, the issue of generalization is necessarily concerning. Fifth, the main exposure and outcome variables were obtained from a questionnaire, so reporting bias was likely. Additionally,

although this study was a cross-sectional survey in which cause-and-effect relationship cannot be established, it was unlikely that nurses with the problem of poor family function preferred to work as non-night or rotation shift. Ultimately, a future prospective cohort study is necessary to elucidate the causality of shift work and family function in both single and married nurses.

Acknowledgements

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