J Occup Health 2008; 50: 79–85

Journal of Occupational Health

Field Study

Association of Job-related Stress Factors with Psychological and Somatic Symptoms among Japanese Hospital Nurses: Effect of Departmental Environment in Acute Care Hospitals

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Abstract: Association of Job-related Stress Factors with Psychological and Somatic Symptoms among Japanese Hospital Nurses: Effect of Departmental Environment in Acute Care Hospitals: Yuri KAWANO, Department of Nursing, School of Health Sciences, Nagoya University—The present study examined degrees of job-related stress factors as well as mental and physical symptoms among Japanese hospital nurses in various departments, and clarified associations of departments and job-related stress factors with those symptoms. A self-administered anonymous questionnaire was distributed to 1,882 full-time nurses at four acute care hospitals in Japan. The survey included demographic factors, and the Brief Job Stress Questionnaire. Among 1,599 nurses who completed all items relevant to the present study, we analyzed data from 1,551 female nurses. The results show that working in operating rooms was associated with fatigue, that working in intensive care units (ICU) was associated with anxiety, and that working in surgery and internal medicine was associated with anxiety and depression independently of demographic factors and job-related stress factors. The physical and mental health of nurses might affect their time off, quality of nursing care and patient satisfaction in acute care hospitals. Therefore, job-related stress factors should be minimized, to improve the physical and mental health of nurses, considering unique departmental demands.
(J Occup Health 2008; 50: 79–85)

Key words: Workplace fatigue, Anxiety, Mental health, Employee performance

Chronic job-related stress factors affect physical and mental health, risk of cardiovascular disease, medical costs and work performance[1–4]. Thus, reducing work stress factors is important to prevent the development of stress-related diseases and to promote worker health.

Nursing is a highly stressful occupation[5–10]. Chronic environmental job-related stress factors among nurses are associated with job satisfaction[11–13] and musculoskeletal disorders[14–16], but not with risk indicators for cardiovascular disease[17]. Such stress factors are also associated with the mental and physical health of nurses[18–27]. However, many Japanese studies of nurses have focused on the association of job-related stress factors with job satisfaction or burnout[28–32]. The physical and mental health of nurses might affect their time off, quality of care and patient satisfaction. Thus, optimal physical and mental health among nurses is important for the quality of nursing care.

Professional nursing is subdivided into various specialties. Specific factors affecting workers' health within each specialty should be identified to reduce workplace stress. Although the scores of work-related stress scales of nurses differ among departments[33–36], few studies have clarified associations between job-related stress factors and psychological and physical health based on the characteristics of each specialty. Therefore, we examined degrees of job-related stress factors as well as mental and physical symptoms, and associations of departments and job-related stress factors with those symptoms by distributing a self-administered questionnaire to nurses in various departments of Japanese acute care hospitals.

Methods

Participants

Full-time nurses (n=1,882) at four acute care hospitals around a large urban center located in central Japan during August 2002 provided written informed consent to completion of a self-administered anonymous questionnaire. A total of 1,737 (92.3%) nurses returned the questionnaires. Among these, 1,599 (1,551 females

Received May 9, 2005; Accepted Sep 28, 2007
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and 48 males) completed all items relevant to the present study. The 48 males were excluded from the analysis because of their small number, and data from 1,551 female nurses (including the head nurses of each ward, registered and licensed practical nurses) were analyzed.

Procedure

The survey was conducted with the cooperation of nursing managers at the four acute care hospitals. The head nurse of each ward distributed the questionnaire and an envelope. Each respondent was informed of the purpose of the self-administered anonymous survey in an introductory letter ; then, voluntarily completed surveys were sealed in the envelopes provided and placed in boxes at each hospital. The survey included demographic factors and the Brief Job Stress Questionnaire (including eight job stress factors, three social support scales, and six psychological and somatic symptom scales)[37].

Demographic factors. Six demographic factors, namely age, gender, marital status, license, work shift, and years of nursing experience, were included. Marital status was classified as married or not married (including divorced and widowed). License was categorized as registered or licensed practical nurses. Work shift was classified as daytime (including duty and on-call) or rotating shifts.

Job-related stress factors and social support scales. Chronic environmental job-related stress factors were assessed using the Brief Job Stress Questionnaire developed by Shimomitsu *et al*.[37] The questionnaire includes eight job-related stress factors and three social support scales regarding quantitative overload (number of items, 3), qualitative overload (3), physical load (1), workplace environment (1), job control (3), skill discretion (1), job fitness (2), interpersonal relationships (3), and support from supervisors (3), coworkers (3), and family and/or friends (3).

Some items were scored in reverse, so that higher scores of job-related stress factors and social support scales indicated higher job overloads, control, skill discretion, fitness and support, and better relationships and workplace environment. The physical load scale was unusable because of lopsided distribution (floor effect).

Psychological and somatic symptom scales. The Brief Job Stress Questionnaire also included six psychological and somatic symptom scales regarding vigor (number of items, 3), irritability (3), fatigue (3), anxiety (3), depression (6) and somatic symptoms (11). Higher scores in these scales indicated more obvious symptoms.

Internal consistency, factorial and criterion-related validity of the job-related stress factors and symptom scales in the Brief Job Stress Questionnaire were demonstrated as described[37].

Data analysis

Mean scores of the seven job-related stress factors and the three social support scales (quantitative and qualitative overload, interpersonal relationships, workplace environment, job control, skill discretion, job fitness, supervisor support, coworker support, family and/or friend support), and the six psychological and somatic symptoms (vigor, irritability, fatigue, anxiety, depression, and somatic symptoms) among six departments (surgery, internal medicine, surgery and internal medicine, intensive care, operating room, and outpatient clinic) were compared using analysis of variance and Bonferroni's test for multiple comparisons.

Years of nursing experience were excluded from the analysis because of a high correlation with age (r=0.94). Multiple linear regression analyses, adjusted for age, marital status, license and work shift, examined the associations of each job-related stress factor and social support scale with each psychological and somatic symptom. Associations between departments with these symptoms (Model I), and between departments and job-related stress factors with symptoms (Model II) were examined using multiple linear regression analyses.

All analyses were conducted using the SPSS Version 9.0 program and the level of significance was set at 5%.

Results

Demographic characteristics of participants

The mean age was 31.4 yr (SD=8.9; range=20–62), and mean years of nursing experience were 9.4 (SD=8.2; range=0.25–40.0). Five hundred and ten nurses (32.9%) were married, 1,465 (94.5%) were registered nurses and 1,157 (74.6%) were rotating shift workers. Of the 1,551 female nurses, 1,016 (65.5%) worked in wards (surgery, 457; internal medicine, 327; surgery and internal medicine, 232), 223 (14.4%) in intensive care units, 92 (5.9%) in operating rooms, and 220 (14.2%) in outpatient clinics.

Associations between job-related stress factors and symptoms

Table 1 shows the associations of each job-related stress factor with symptoms adjusted for age, marital status, license and work shift using multiple linear regression analyses. Higher job control and job fitness, and better interpersonal relationships, supervisor support and coworker support were most obviously associated with vigor. Lower job fitness and poorer interpersonal relationships were most obviously associated with irritability. Higher quantitative and qualitative overloads, less job control and lower job fitness were most obviously associated with fatigue. Higher quantitative and qualitative overloads and less job control were most obviously associated with anxiety. Less job control, lower job fitness, and poorer interpersonal relationships and

Table 1. Associations of job-related stress factors with symptoms among Japanese female hospital nurses (N=1,551) [a]

Job-related stress factor	Vigor	Irritability	Fatigue	Anxiety	Depression	Somatic symptoms
Quantitative overload	–0.112***	0.184***	0.317***	0.295***	0.21 ***	0.182***
Qualitative overload	–0.077**	0.075**	0.223***	0.331***	0.141***	0.158***
Interpersonal relationships	0.267***	–0.308***	–0.193***	–0.134***	–0.299***	–0.183***
Workplace environment	0.081**	–0.187***	–0.085**	–0.033	–0.113***	–0.114***
Job control	0.271***	–0.153***	–0.237***	–0.282***	–0.281***	–0.167***
Skill discretion	0.14 ***	–0.064*	–0.066**	–0.08 **	–0.171***	–0.1 ***
Job fitness	0.405***	–0.265***	–0.221***	–0.185***	–0.377***	–0.179***
Supervisor support	0.268***	–0.194***	–0.155***	–0.134***	–0.260***	–0.149***
Coworker support	0.279***	–0.105***	–0.106***	–0.124***	–0.209***	–0.098***
Family/friend support	0.204***	–0.083**	–0.083**	–0.103***	–0.191***	–0.124***

Multiple linear regression analysis adjusted for age, marital status, license and work shift. [a] Standardized regression coefficients. * $p<0.05$. ** $p<0.01$. *** $p<0.001$.

supervisor support were most obviously associated with depression. Higher quantitative overload, lower job fitness, and poorer interpersonal relationships were most obviously associated with somatic symptoms.

Mean scores of job-related stress factors and symptoms by department

Table 2 shows that nurses in the outpatient clinic had a significantly lower score of quantitative overload than those in any other department. Nurses in the ICU had a significantly higher score for qualitative overload than those in any other department. Nurses in the outpatient clinic had a significantly lower score for qualitative overload than those in surgery, internal medicine, and surgery and internal medicine. Intensive care nurses had a significantly lower score for interpersonal relationships than those in surgery, surgery and internal medicine, and the outpatient clinic. In addition, outpatient nurses had a significantly higher score for interpersonal relationships than those in surgery, and internal medicine. Nurses in surgery and internal medicine had significantly lower workplace environment scores than those in the other departments. Similarly, intensive care nurses had a significantly higher workplace environment score than those in the outpatient clinic. Operating nurses had a significantly lower score of job control and job fitness than those in any other department. Nurses in the ICU had a significantly higher score of skill discretion than those in the outpatient clinic. Surgical nurses had a significantly higher score for supervisor support than those in internal medicine.

With respect to psychological and somatic symptoms, nurses working in operating rooms had a significantly lower score of vigor than those in surgery and the outpatient clinic. Nurses in internal medicine had a significantly higher score of irritability than those in the ICU and the outpatient clinic. Nurses in the outpatient clinic had a significantly lower fatigue score than those in the other departments except for the ICU. Similarly, nurses in the ICU had a significantly lower score of fatigue than those in the operating room. The anxiety score of outpatient nurses was significantly lower than those of nurses in the other departments except for the operating room. In addition, their scores for depression were significantly lower than those of nurses in any other department. The score for somatic symptoms was significantly higher among nurses in surgery and internal medicine than among those in the outpatient clinic.

Associations between departments and symptoms

Model I in Table 3 shows that working in the operating room was significantly associated with a lower score of vigor and higher scores of fatigue and depression after adjusting for age, marital status, license and work shift. Working in surgery and internal medicine or the ICU was significantly associated with a higher score of anxiety.

Associations of departments and job-related stress factors with symptoms

Model II shows associations of departments and job-related stress factors with symptoms adjusted for age, marital status, license and work shift using multiple linear regression analyses. Working in the operating room was significantly associated with a higher score of fatigue after adjusting for job-related stress factors. Similarly, working in surgery and internal medicine was significantly associated with higher scores of anxiety and depression. Working in the ICU was significantly associated with a higher score of anxiety.

Quantitative overload was significantly and negatively associated with vigor, but quantitative and qualitative overloads were significantly and positively associated with fatigue, anxiety, depression and somatic symptoms. Interpersonal relationships, job control, job fitness,

Table 2. Mean scores of job-related stress factors and symptoms by department among Japanese female hospital nurses (N=1,551)

Variable	Surgery[b]	Internal medicine[c]	Surgery and internal medicine[d]	Intensive care unit[e]	Operating room[f]	Outpatient clinic[g]	Total	F (5,1545)[a]
Quantitative overload	10.2[g]	10.0[g]	10.1[g]	9.9[g]	9.6[g]	8.8	9.9	23.11***
Qualitative overload	10.3[e,g]	10.4[e,g]	10.4[e,g]	10.8	10.2[e]	9.7[e]	10.3	11.89***
Interpersonal relationships	8.6[e,g]	8.5[g]	8.8[e]	8.1	8.5	9.1[e]	8.6	7.71***
Workplace environment	2.3	2.2	2.8[b,c]	3.0[b,c]	2.9[b,c]	2.6[b,c,e]	2.5	30.74***
Job control	7.2[f]	7.0[f]	7.1[f]	7.0[f]	6.2	6.9[f]	7	5.57***
Skill discretion	3	3	3.1	3.1	2.9	2.9[e]	3	2.69*
Job fitness	5.7[f]	5.6[f]	5.8[f]	5.5[f]	4.9	5.6[f]	5.6	5.57***
Supervisor support	7.4	7.0[b]	7.2	7.4	6.8	7.2	7.2	3.27**
Coworker support	8.5	8.4	8.5	8.6	8.7	8.6	8.5	0.6
Family/friend support	10.3	10.3	10.4	10.3	10	10.3	10.3	0.64
Vigor	6.5[f]	6.3	6.1	6.3	5.6	6.7[f]	6.3	4.23**
Irritability	7.1	7.4	7.2	6.8[c]	7.2	6.7[c]	7.1	4.08**
Fatigue	8.6[g]	8.6[g]	8.7[g]	8.2	9.3[g,e]	7.7	8.5	8.44***
Anxiety	7.0[g]	7.0[g]	7.4[g]	7.4[g]	7	6.4	7	5.34***
Depression	12.1[g]	12.3[g]	12.5[g]	12.1[g]	12.5[g]	10.8	12	6.17***
Somatic symptoms	21	21.1	21.9	21.1	21.3	20.0[d]	21	2.65*

[a] Analysis of variance. Multiple comparison test by Bonferroni's procedure. * $p<0.05$. ** $p<0.01$. *** $p<0.001$.
Quantitative overload: [g] $p<0.01$, compared with operating room. [g] $p<0.001$, compared with surgery, internal medicine, surgery and internal medicine, and intensive care unit. Qualitative overload: [e] $p<0.05$, compared with internal medicine, surgery and internal medicine, and operating room. [e] $p<0.001$, compared with surgery, and outpatient clinic. [g] $p<0.001$, compared with surgery, internal medicine, and surgery and internal medicine. Interpersonal relationships: [e] $p<0.05$, compared with surgery. [e] $p<0.01$, compared with surgery and internal medicine. [e] $p<0.001$, compared with outpatient clinic. [g] $p<0.01$, compared with surgery. [g] $p<0.001$, compared with internal medicine. Workplace environment: [b] $p<0.01$, compared with outpatient clinic. [b] $p<0.001$, compared with surgery and internal medicine, intensive care unit, and operating room. [c] $p<0.001$, compared with surgery and internal medicine, intensive care unit, operating room, and outpatient clinic. [e] $p<0.001$, compared with outpatient clinic. Job control: [f] $p<0.01$, compared with internal medicine, surgery and internal medicine, intensive care unit, and outpatient clinic. [f] $p<0.001$, compared with surgery. Skill discretion: [e] $p<0.05$, compared with outpatient clinic. Job fitness: [f] $p<0.05$, compared with intensive care unit. [f] $p<0.01$, compared with internal medicine, and outpatient clinic. [f] $p<0.001$, compared with surgery, and surgery and internal medicine. Supervisor support: [b] $p<0.05$, compared with internal medicine.
Vigor: [f] $p<0.01$, compared with surgery, and outpatient clinic. Irritability: [c] $p<0.01$, compared with intensive care unit, and outpatient clinic. Fatigue: [g] $p<0.001$, compared with surgery, internal medicine, surgery and internal medicine, and operating room. [e] $p<0.01$, compared with operating room. Anxiety: [g] $p<0.05$, compared with surgery, and internal medicine. [g] $p<0.001$, compared with surgery and internal medicine, and intensive care unit. Depression: [g] $p<0.01$, compared with intensive care unit, and operating room. [g] $p<0.001$, compared with surgery, internal medicine, and surgery and internal medicine. Somatic symptoms: [d] $p<0.01$, compared with outpatient clinic.

supervisor support, coworker support, and family and/or friend support were significantly and positively associated with vigor. Quantitative overload and skill discretion were significantly and positively associated with irritability. Interpersonal relationships, workplace environment, job fitness and supervisor support were significantly and negatively associated with irritability. Interpersonal relationships, job control, job fitness, supervisor support, and family and/or friend support were significantly and negatively associated with fatigue. Job control, job fitness, and family and/or friend support were significantly and negatively associated with anxiety. Interpersonal relationships, job control, job fitness, supervisor support, and family and/or friend support were significantly and negatively associated with depression. Interpersonal relationships, workplace environment, job control, job fitness, supervisor support, and family and/or friend support were significantly and negatively associated with somatic symptoms.

Discussion

This study clarified associations of departments and job-related stress factors with psychological and somatic symptoms in female nurses at acute care hospitals, whereas previous studies have mostly focused on the characteristics of all nurses or of one nursing specialty.

Table 3. Associations of departments and job-related stress factors with symptoms among Japanese female hospital nurses (N=1,551) [a]

Variable	Vigor	Irritability	Fatigue	Anxiety	Depression	Somatic symptoms
Model I						
Surgery[b]	0.099	0.028	0.068	0.107	0.056	0.009
Internal medicine[b]	0.059	0.083	0.064	0.106	0.075	0.013
Surgery and internal medicine[b]	0.023	0.024	0.063	0.128*	0.067	0.061
Intensive care unit[b]	0.055	–0.039	–0.012	0.128*	0.033	0.013
Operating room[b]	–0.104**	0.042	0.124 ***	0.028	0.064 *	0.056
Adjusted R^2	0.019***	0.01 **	0.039 ***	0.029***	0.039 ***	0.011**
Model II						
Surgery[b]	0.054	–0.006	0.036	0.107	0.071	–0.009
Internal medicine[b]	0.036	0.042	0.029	0.092	0.071	–0.017
Surgery and internal medicine[b]	–0.023	0.026	0.046	0.125**	0.092 *	0.064
Intensive care unit[b]	0.042	–0.065	–0.049	0.096*	0.024	–0.002
Operating room[b]	–0.034	–0.013	0.061 *	–0.033	–0.013	0.012
Quantitative overload	–0.06 *	0.142***	0.231 ***	0.136***	0.135 ***	0.097**
Qualitative overload	–0.044	0.002	0.095 **	0.246***	0.072 **	0.11 ***
Interpersonal relationships	0.092***	–0.216***	–0.082 **	–0.005	–0.127 ***	–0.075**
Workplace environment	0.012	–0.084**	–0.006	0.003	–0.018	–0.075**
Job control	0.11 ***	–0.027	–0.126 ***	–0.186***	–0.122 ***	–0.07 **
Skill discretion	0.001	0.052*	0.006	–0.035	–0.041	–0.038
Job fitnes	0.285***	–0.182***	–0.137 ***	–0.106***	–0.253 ***	–0.098***
Supervisor support	0.065*	–0.072*	–0.058 *	–0.051	–0.091 ***	–0.068*
Coworker support	0.094**	0.046	0.019	–0.005	0	0.037
Family/friend support	0.101***	–0.04	–0.051 *	–0.085**	–0.119 ***	–0.1 ***
Adjusted R^2	0.249***	0.169***	0.205 ***	0.229***	0.288 ***	0.111***

Models I and II: Multiple linear regression analysis adjusted for age, marital status, license and work shift. [a] Standardized regression coefficients. [b] Dummy variables (outpatient clinic regarded as a reference category). * $p<0.05$. ** $p<0.01$. *** $p<0.001$.

The results of this study should help the design of workplace procedures for reducing stress factors in the workplace that would improve the mental and physical health of nurses based on the unique characteristics of the required tasks in the various departments.

We showed here that higher quantitative and qualitative overloads most obviously affected fatigue, anxiety, depression and somatic symptoms independently of age, marital status, license, work shift, department and support from family and/or friends among Japanese female hospital nurses. These results agree with previous studies[15, 16, 21, 23, 24, 26]. Hospital nurses with an excessive amount of work under the pressure of deadlines and difficulties associated with caring for patients with various complications might be more likely to feel physically and mentally exhausted.

Less job control most obviously affected lack of vigor, fatigue, anxiety and depression, findings that were consistent with those of other studies[21, 23, 25]. Less job control might be a key risk factor for psychological distress such as lack of vigor, fatigue, anxiety, and depression in hospital nurses. Moreover, increasing job control might be important for high quantitative and qualitative overload, since nurses with high job control could function quite efficiently.

Lower job fitness most obviously affected lack of vigor, irritability, fatigue and depression. The job fitness scale consisted of the feeling of being suited to the job and being challenged by tasks. Therefore, the suitability of individual nurses for each job should be considered before assigning tasks, and the challenge of the task should be increased to support the objective of each nurse, in order to help ensure good mental health among nurses.

This study showed that operating room nurses developed fatigue independently of demographic factors and job-related stress factors. These nurses are trained to assist doctors, observe the overall condition of patients and care for those at risk of developing a critical condition during surgery. Moreover, because nurses mostly cannot communicate with patients undergoing surgery, they must focus intently on changes in the condition of unconscious patients. This might explain why operating nurses might

be more likely to feel fatigue.

Working in the ICU was associated with anxiety independently of demographic and job-related stress factors. Because they mainly care for patients at high risk of death who have communication difficulties, ICU nurses might feel anxiety over meeting the physical and psychological needs of such patients.

Working in the surgery and internal medicine department was also associated with anxiety and depression independently of demographic factors and job-related stress factors. This may be accounted for by the fact that the nurses in these departments must care for many patients with various acute or chronic diseases and postoperative complications. Moreover, because the nurses are pressured during day and night shifts to care for such patients, they might be more likely to feel exhaustion and depression.

The cross-sectional study design means the present findings should be carefully interpreted. The causal relationships between job-related stress factors and psychological and somatic symptoms should be clarified by longitudinal study designs. Because the nurses in this study were limited to surgery, internal medicine, surgery and internal medicine, the ICU, the operating room, and outpatient clinic of four acute care hospitals around a large urban center, job-related stress factors among nurses in hospitals with different functions, or located in different regions should be investigated. Furthermore, the type of mental status among nurses that affects the quality of nursing care and patient satisfaction should be investigated.

In conclusion, working in some departments affected the mental health of nurses independently of demographic and job-related stress factors. Therefore, job-related stress factors should be minimized to optimize the physical and mental health of nurses according to departmental tasks and features.

Acknowledgments: Professor Hiroshi Kurita, Department of Mental Health, Tokyo University Graduate School of Medicine is gratefully acknowledged for providing valuable suggestions. Thanks are due to all the nurses who participated in this survey.

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