EFFECTS OF JOB STRESS ON MENTAL HEALTH AND ACCIDENTS IN HOSPITAL NURSES

病院勤務看護婦における職業性ストレスがメンタルヘルス
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Contents

Abstract

The purpose of this study was to examine effects of job stress on mental health and accidents among Japanese hospital nurses using two job stress models: Demand-Control (DC) model and Effort-Reward Imbalance (ERI) model. In a study on 1,086 Japanese nurses of four general hospitals by using a self-administered questionnaire, 811 female nurses, aged 20 to 60 years, were subjected to final analyses. Job overload, control and social support and stress responses (depression, job satisfaction and accidents) were measured by a part of the NIOSH Job Stress Questionnaire. New scales were also developed to measure psychological job reward and two nursing-related stressors: responsibility for patient's life and experience of patient's death. Multiple linear regression analysis revealed that job overload and responsibility for patient's life had significant positive associations with depression after controlling for confounding factors, such as age, marital status and working schedules (p<0.05). Job reward, supervisor support and coworker support had significant negative associations with depression. Job overload and experience of patient's death had significant negative associations with job satisfaction, while job reward and supervisor support had significant positive associations. Logistic regression analysis revealed that responsibility for patient's life had significant positive associations with accidents. These results suggested that the ERI model is more useful for predicting mental health than the DC model. Reducing job overload and increasing psychological job reward and supervisor support may improve the mental health of Japanese hospital nurses.

Key words: job stress, nurses, overload, control, social support, reward, depression, job satisfaction, accidents

Introduction

Nursing is a stressful profession (ILO, 1996; Leatt and Schneck, 1980; Sawatzky and Mnitoba, 1996; Scully, 1980) and is unique in irregular work schedules and accountability to multiple levels of authority shared by other occupations. Nurses have many unpleasant and physically demanding tasks, and have to deal with seriously ill or dying patients. As the interface between hospital and patients, nurses are expected to keep the balance between detachment and involvement, without betraying symptoms of stress. Sources of nursing stress include job overload, experiences of separation and death, responsibility for patient's life, poor communication with other medical staffs, emotional demands of patients and their families, and an ever-changing work environment (Adey, 1987; Hillhouse and Adler, 1991; Hingley and Harris, 1986).

Recently, the concept of 'burnout' was applied to the nursing literature to describe negative consequences of chronic exposure to job stressors (Boyle et al., 1991; Ceslowitz, 1989; Harris, 1989a; Kandolin,1993; Oehler et al., 1991; Rich et al., 1987; Servellen and Leake, 1993). Burnout is characterized as a syndrome of maladaptive psychological, psychophysiological and behavioral reactions to job stress (Cronin-Stubbs and Rooks, 1985). It's psychological manifestations include frustration and anger; lack of enthusiasm; isolation and withdrawal; depression and feelings of entrapment; and negative perceptions of self and job (Keane et al., 1985). Burnout may result in impaired job performance, neglect or dehumanization of patients, tardiness, absenteeism and use of psychoactive drugs (McCraine et al., 1987). In Japan, Doi (1988) reported that nurses had many proportions of burnout than doctors. Hisashige (1991) reported that nurses had higher scores of burnout than municipal female

workers. According to Pines (1993), everyone can experience stress, but burnout can only be experienced by people who entered their careers with high ideals, motivation and commitment. A person without such initial motivation can experience job stress, alienation or depression, but not burnout. The most of burnout studies focused on psychological factors, namely individual perceptions and susceptibility. On the contrary, the usual approach of primary prevention in workplace addresses environmental ones, to identify and reduce stressful working conditions and environments which produce depression, job dissatisfaction and accidents.

The instrument to measure job stress among nurses has not yet been established. Only a few studies have used specially designed measures of stress in nursing (Cooper and Mitchell, 1990; Numerof and Abrams, 1984). For example, Harris (1989b) found that scores in the Nurse Stress Index were significantly correlated with the Crown-Crisp Experiential Index (CCEI), a putative measure of common symptoms of psychoneurotic disorders. However, a large number of job stress studies on nurses lacked the use of validated and reliable assessment tools and a guiding theory or model (Hillhouse and Adler, 1991). Moreover, a few studies had examined the effects of job stressors on mental health (Baglioni et al., 1990; Hiscott and Connop, 1990; Tyler and Cushway, 1992).

Job stress has been recognized as a major issue in the field of occupational health and has been linked to various health conditions, such as coronary heart disease and psychological symptoms (Alterman et al., 1994; Johonson et al., 1989; Johnson and Hall, 1988; Karasek et al., 1981; Karasek et al., 1988; Karasek and Theorell, 1990; Moller et al., 1991; Pieper et al., 1989,

Reed et al., 1989; Theorell et al., 1988). The Job Demand-Control (DC) model is a major theory in the field of job stress research. According to this model, a combination of high job demand and low control (high job strain) over a job predicts adverse health effects (Karasek and Theorell, 1990). Job strain as defined in this model has been linked to various kinds of health problems, such as coronary heart disease and risk factors, psychological symptoms and sick days (Karasek et al., 1981; Karasek et al., 1988; Karasek and Theorell, 1990; Pieper et al., 1989; Theorell et al., 1988). Many studies have been conducted based on the DC model in Japan as well (Kawakami et al., 1992; Kawakami et al., 1993; Kawakami et al., 1995; Kayaba et al., 1990).

Using the DC model in health care workers including 211 nurses (73 %), Landsbergis (1988) showed that depression, job dissatisfaction and burnout had significantly higher in jobs with a combination of high job demand and low control. But an interaction between job demand and job control was no significant. Using the DC model among nurses and nurses' aides, Jonge et al. (1996) showed that high levels of control attenuated emotional exhaustion due to job demands. There was a significant interaction between job overload and job control.

The model of 'Effort-reward imbalance at work' considers the relationships between stressful contexts and individual coping behavior (Siegrist, 1995a). It assumes that a negative trade-off between high effort and low reward in working impairs successful self-regulation and triggers sustained autonomic activation. According to the model, the combined effects of high effort and low reward predict a coronary heart disease, elevated fibrinogen and arterial hypertension (Siegrist, 1995a; Siegrist, 1995b; Siegrist, 1996; Siegrist et

al., 1992; Siegrist et al., 1997; Siegrist and Peter, 1996; Stansfeld et al., 1998; Peter et al., 1998; Peter and Alfredsson et al., 1998).

As reviewed, the majority of studies on nurses focused on individual factors (burnout), but a little attention has been paid to environmental factors (job stress factor) of nurses. Furthermore, only a few studies have used the DC model in hospital settings. There is no study to examine the relationships between job stress and mental health among nurses using the ERI model. In addition, the majority of such studies was conducted in Western countries, and the characteristics of job stress in Japanese hospital nurses remain unclear.

For all of these reasons, I conducted this study to examine effects of job stress on mental health and accidents based on the DC and ERI models as well as social support and nursing-related stressors in Japanese hospital nurses.

Methods

Subjects

        In 1995-1997, this survey was conducted with 1,086 full time hospital nurses in four general hospitals (approximately 100 to 900 beds) near Tokyo as potential subjects by using a self-administered questionnaire. The survey was carried out with their informed consent and the whole procedure guaranteed full confidentiality of the information gathered. A total of 977 nurses (90%) responded. Because of small number, 20 male nurses were excluded from analysis. Subjects of this study were 811 female nurses, aged 20 to 60 years (mean=31.7, SD=9.7), who completed all of the questions. These nurses were stationed at wards (n=631, 77.8%), outpatient departments (n=77, 9.5%), operating rooms (n=43, 5.3%) and ICUs (n=60, 7.4%). The subjects included supervisors, registered nurses, licensed practical nurses. Table 1 shows demographic and other characteristics of the subjects. Thirty-four percent were married and 81 percent were shift workers.

[Table 1]

Methods

1. Outline of questionnaire

        I used three different types of questionnaire in each hospital independently. For this study, I selected common items in each questionnaire, as shown in Appendix 1, consisting of five items on demographic information, the National Institute for Occupational Safety and Health (NIOSH) scale (job overload, job control, social support, job satisfaction, accidents and depression), and originally developed three scales (psychological job reward, responsibility for patient's life, experience of patient's death).

Job overload, job control, social support, job satisfaction and accidents were measured by the NIOSH Job Stress Questionnaire (Hurrell and McLaney, 1988). It is a generic instrument compiled and extensively used by NIOSH based on theoretical model of job stress and health. Job stress factors refer to work conditions that lead to stress responses. To measure depression, the NIOSH job stress questionnaire involves the Center for Epidemiologic Studies Depression Scale (CES-D) of the U.S. National Institute of Mental Health (Radloff, 1977). The CES-D is a self-report scale designed to assess depressive symptomatology in the general population. The Japanese version of CES-D was translated and validated by Shima et al. (1985). The Japanese version of the NIOSH job stress questionnaire was developed by Haratani et al. and psychometric properties were confirmed (Haratani et al., 1993; Haratani et al., 1994; Haratani et al., 1995; Haratani et al., 1996).

I also developed new job reward and nursing-related stressor scales on the basis of pre-tests and hearings. The questionnaire consists of total 13 items, rated on a four-point Likert-type scale (1=not at all to 4=a great deal). Through the results of varimax-rotated principal component analysis on the 811 subjects, I obtained assumptive three separate factors with factor loadings ranging from 0.55 to 0.90, as shown in Table 2. I defined the following three scales: (1) Psychological job reward (Factor 1), (2) Responsibility for patient's life (Factor 2) and (3) Experience of patient's death (Factor 3).

[Table 2]

2. Scales on job stress factors

Job overload. Quantitative workload was measured using a scale developed by Caplan et al's (1975). The scale consists of total 4 items, rated

on a five-point Likert-type scale (1=rarely to 5=very often). High scores indicate high stress.

Job control. Job control was measured by using Ganster's (1984) scale. The scale contains 16 items, rated on a five-point Likert-type scale (1=very little to 5=very much). High scores indicate high control.

Job reward. Table 2 shows each item of newly developed job stressor scale. I defined worth working as psychological job reward (Factor 1), abbreviated as job reward in the following text and tables. Job reward contains 4 items, high scores indicate high job reward.

Social support. Social support was measured by using Caplan et al's (1975) scale. This scale contains 2 subscales: supervisor support and coworker support, and consists of 8 items, rated on a five-point Likert-type scale (1=very much to 5=don't have any such person). High scores indicate high social support.

Nursing-related stressor scale. 'Responsibility for patient's life (Factor 2)' contains 5 items, 'Experience of patient's death (Factor 3)' contains 4 items. High scores on these two scales indicate high stress.

3. Mental health indicators and other stress responses

Depression. CES-D scale contains 20 items, rated on a four-point Likert-type scale (0=rarely or none of the time: less than 1 day to 3=most or all of the time: 5-7 days). High scores indicate high depression.

Job satisfaction. Job satisfaction was measured by using Caplan's (1975) scale. The scale contains 4 items, rated on three or four point. High scores indicate high job satisfaction.

Accidents. Accident was measured by the item, "During the past 6 months,

did you have any of the job accidents?"

4. Other covariates

Information on basic demographics (age, gender, marital status, working schedule and years of nursing experience) was collected. Marital status was classified into married or unmarried (including divorced and separated for death). Working schedule was classified into shift and non-shift groups. Because of a high correlation coefficient between age and years of nursing experience ($r=0.89$), the variable on years of nursing experience was excluded from analysis.

Statistical Analysis

I calculated job stress factors (job overload, control, reward, social support, responsibility for patient's life and experience of patient's death) and stress responses (depression and job satisfaction), as shown in Appendix 2. I calculated job strain (ratio of job overload to job control), effort-reward imbalance (ratio of job overload to job reward). Partial correlation coefficients were simultaneously calculated between job stress factors and depression or job satisfaction after controlling for confounding factors such as age, marital status (1=married and 2=unmarried), and working schedule (1=non-shift and 2=shift). I compared the accident experienced and not-experienced groups by analysis of covariance (ANCOVA) with confounding factors as a covariate. In scales such as job overload, control, reward, the median was used as a cut-off point between high and low (1=high and 0=low). I also examined the main effects and interactions among job stress factors using ANCOVA with confounding factors as a covariate. I focused the analysis on the following interactions: (1) Job overload and control, (2) Job overload and reward.

Multiple liner regression analyses were performed to evaluate effects of job stress factors on depression or job satisfaction after controlling for confounding factors. Standardized regression coefficients were calculated. Logistic regression analyses were performed to reveal the effects of job stress factors on accidents after controlling for confounding factors. Regression coefficients were calculated. I conducted the analyses by using SPSS for Windows 7.1.5.

Results

Table 3 shows that the 9 scales had acceptable alpha reliability coefficients ranging from 0.73 to 0.93.

Sixty-nine (8.5%) nurses reported the experiences of occupational accidents during the past 6 months. The mean depression score of 17.1 on CES-D was higher than other occupations, with 414 (51.0%) nurses presenting higher scores than the cut-off (15/16).

[Table 3]

Table 4 shows partial correlation coefficients among job stress factors, depression and job satisfaction after controlling for confounding factors. Job overload, job strain (ratio of job overload to job control), effort-reward imbalance (ratio of job overload to job reward), responsibility for patient's life and experience of patient's death had significant positive correlation with depression. Job reward, job control, supervisor support and coworker support had significant negative correlation with depression. Job overload, job strain, effort-reward imbalance and experience of patient's death had significant negative correlation with job satisfaction. Job control, job reward, supervisor support and coworker support had significant positive correlation with job satisfaction.

[Table 4]

Table 5 shows a comparison of job stress factors scores between two levels of accidents. The mean scores of responsibility for patient's life and experience of patient's death were significantly higher in the accident experienced group than the not-experienced group after controlling for confounding factors. The mean scores of supervisor support and coworker support were significantly lower in the accident experienced group than the not-

experienced group after controlling for confounding factors.

[Table5]

I examined whether or not the job stress models were applicable to Japanese nurses (ANCOVA). Table 6 indicates that the condition of high job overload and low control and the condition of high job overload and low job reward related to severer depression and dissatisfaction than the other conditions.

[Table 6]

Table 7 shows effects of job stress factors on depression and job satisfaction by ANCOVA according to the two models. The results are summarized as follows:

1. Job demand-control model. With depression, job overload had a significant positive association. With job satisfaction, job overload had a significant negative association, and job control had a significant positive association. However, their two-way interaction was not significant for either outcome variable.

2. Effort-reward imbalance model. Similarly, with depression, job overload had a significant positive association, and job reward had a significant negative association. With job satisfaction, job overload had a significant negative association, and job reward had a significant positive association. But their two-way interaction was not significant for either outcome variable.

[Table 7]

By using ANCOVA, I found no significant interactions among job stress factors (job overload, control, reward and social support) for accidents.

The left 2 columns of Table 8 shows that multiple liner regression analysis

revealed significant positive effect of job overload and negative effects of job reward, supervisor support and coworker support on depression. Similarly, there were significant negative effects of job overload and experience of patient's death and positive effects of job reward and supervisor support on job satisfaction. The two components of the ERI model (job overload and job reward) showed significant associations with depression and job satisfaction, whereas only one of the two components of the DC model (job overload) showed a significant association. These results suggest that the ERI model is better than the DC model to predict mental health in hospital nurses. In addition to variables of job stress model, two nursing-related stressors were significantly associated with depression or job satisfaction.

The right 1 column of Table 8 also shows the association of job stress factors with accidents using logistic regression analysis. Only responsibility for patient's life had significant positive associations with accidents after controlling for confounding factors.

[Table 8]

Discussion

In this study, job stress factors (job overload, control, reward and social support) and nursing-related stressors had significant associations with depression, job satisfaction and accidents.

Multiple linear regression analysis revealed that job overload had strong significant effects on depression and job satisfaction consistent with previous studies (Jonge et al., 1996; Landsbergis, 1988), while job control had no significant effect inconsistent with previous studies (Karasek and Theorell, 1990; Kawakami et al., 1998). The Japan Work Stress and Health Cohort (JWSHC) Study Group, which is now conducting a large-scale prospective study on job stress and health, showed distributions of job stress among various occupations, such as production workers, clerks and professionals with the NIOSH Job Stress Questionnaire (Kawakami et al., 1997; Kawakami et al., 1998). The nurses in my study had higher mean scores of job overload than other female occupations in the JWSHC study, and lower mean scores of job control than other female professionals. Karasek and Theorell (1990) showed that U.S. nurses were 'active (high job overload and high control)' workers, in the Quality of Employment Surveys (QES). Since Japanese nurses work under the operational control of doctor, they may lack decision-making discretion unlike nurses in the U.S. The characteristics of Japanese hospital nurses, high overload and low control may account for their differences from other Japanese female workers and nurses in the U.S.

Job reward had strong significant effects on depression and job satisfaction. Psychological job reward may be important for mental health in nurses. Since highly motivated people tend to select nurses as their job,

nurses might be more vulnerable to lack of reward from their daily work. The approach to increase a psychological job reward may be important to maintain mental health.

This study also showed that supervisor support had strong associations with depression and job satisfaction. Supervisor support is associated with low depression and high job satisfaction (Revicki and May, 1989). Coworker support was also associated with low depression but not high job satisfaction. Supervisor support may be a more important factor than coworker support, and lack of social support at work may make staffs vulnerable to depression and job dissatisfaction. Landsbergis (1988), Boumans et al. (1992) and Jonge et al. (1996) measured worksite support as a sum of supervisor support and coworker support in nurses and showed a negative association between worksite support and psychological distress. These previous findings agree with mine. However it was not clear that supervisor support was more important factor for mental health than coworker support in these studies. Although a replication study including an international comparison is needed, nurse supervisors should pay more attention to increase staff's self-esteem and psychological job reward in order to improve their mental health.

In addition to job stressors included in the DC and ERI models, nursing-related stressors were used in this study. Experiences of patient's death were significantly related to decrease of job satisfaction. Responsibility for patient's life had significant positive associations with accidents and depression. The qualitative overload, such as responsibility for patient's life is also important factor for psychological and behavioral stress responses. Gray-Toft and Anderson (1981) reported that exposure to death and dying was one of the top

three sources of stress for all nurses in every levels and units in a hospital. Patient's death may decrease self-esteem of nurses, while factors such as recovery of patients, improvement of symptoms and expression of patient's gratitude may increase job satisfaction. Nurses often experience unreasonable blame from patient's family concerning patient's death. Although nursing is basically done as a team, a nurse may seriously take patient's death as her/his own responsibility. Nurses who experienced patient's death may become more fearful of death and more alexithymic as a coping, and may show impersonal responses towards patients under their care. These effects result in the development of burnout. My findings suggest that nurse education need to involve teachings about experiences of patient's death to increase job satisfaction of nurses.

As for the DC model, only job overload had significant effects on depression and job satisfaction after controlling for confounding factors. One component (i.e., job overload) of the two mental health indicators in nurses in the DC model showed a significant association, whereas the other one (i.e. job control) failed to show that in this nurse sample. An interaction between job overload and job control was not significant. The results suggest that the DC model is not applicable to Japanese nurses. To date, only three studies were conducted in nurses using the DC model. Seago and Faucett (1997) examined differences of job stress among nurses, nurse assistants and clerical staff. However, their results are not relevant to compare those in this study, since they did not measure outcome, such as mental heath. Landsbergis (1988) showed that depression, job dissatisfaction and burnout were significantly more common in jobs with a combination of high job demand and low control in health care

workers including 211 nurses. But he failed to show a significant interaction between job overload and job control. On the other hand, Jonge et al. (1996) reported that burnout (emotional exhaustion) was associated with high job overload and low social support, but not with job control in 220 subjects consisting of nurses and nurses' aides. But they found a significant interaction between job overload and job control. The subjects in Landsbergis' study (1988) included a mixed sample of 211 nurses and 81 other hospital employees (i.e., 22 nurses' aides, 59 other occupations, such as food service worker, housekeeper, social worker, technician and therapist). Since the present study consisted of a single occupation group, effects of job control may be weaker as previously suggested (Karasek and Theorell, 1990). However, with nurses and nurses' aides as subjects, Jonge et al. (1996) showed buffering effect of job control on the association between job demands and burnout. One possible explanation is that Japanese nurses have too much job overload for their job control. Their job control is not effective to buffer their overwhelmingly high job overload. To test this point, a cross-national comparison of job stressors and their association with mental health between Japan and U.S. should be conducted in the future. In my study, an interaction between job overload and job control did not emerge. The result supports findings of Landsbergis, but not those of Jonge et al., who showed that the revised model partially supports the DC model, although it was not provide direct support the DC model. However, the interaction in the DC model remains inconsistent.

This is the first study in which the association between job overload and psychological job reward was examined in nurses. In the ERI model, job overload and job reward had strong significant effects on depression and job

satisfaction, although there was no significant interaction between both components. These associations remain significant after controlling for new nursing-related stressors. Of the mental health indicators in nurses, two components of the ERI model showed significant associations, whereas only one (i.e. job overload) of the DC model showed a significant association. The findings suggested that the ERI model is more useful than the DC model in the study of mental health of Japanese hospital nurses.

Several limitations of my study need to be taken into consideration. Firstly, since this study was cross-sectional questionnaire survey, these associations do not necessarily mean causal relationships. An intervention study is needed to clarify the effects of job stressors on mental health in hospital nurses. Secondly, I did not examine the effects of job title, such as head nurses or staff nurses. However, the position is generally associated with the age in Japanese hospital nurses. The position may have little effect on mental health and accidents, because all statistical analyses were conducted with age controlled for. Thirdly, two important components were not measured: extrinsic job reward, such as salary or support from doctors. Further research needs to include them as additional variables.

Despite these limitations, this study suggests that the ERI model is more useful for predicting mental health of nurses than the DC model. Reducing job overload and increasing psychological job reward and supervisor support may improve the mental health of Japanese hospital nurses. Reducing nursing-related stressors (i.e. responsibility for patient's life and experience of patient's death) may also be effective to improve mental health, and to reduce accidents.

Acknowledgements

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Table 1. Demographic and other characteristics of subjects (N=811)

Variables	Mean	SD	Range
Age (years)	31.7	9.7	20 – 60
Years of employment (N=795)	5.5	6.2	0 – 34.4
Years of nursing experience (N=791)	8.9	8.3	0.25 – 40.8

Variables	N	%
Marital status		
Married	276	34.0
Unmarried	535	66.0
Working schedule		
Non-shift workers	155	19.1
Shift workers	656	80.9

Table 2. Factor analysis of new job stressor scales

Items	Factor loadings
Factor 1: Psychological job reward	
Are your job worth doing?	0.895
Are you proud of your job?	0.881
Can you bring your ability fully into your work?	0.748
Have you ever been acknowledged by your patients for what you have done for them?	0.673
Factor 2: Responsibility for patient's life	
Since there is a likelihood that accidents occur, attention always needs to be paid.	0.849
Every effort should be made to prevent medical accidents.	0.795
Inappropriate coping may have bad influence on patients.	0.694
Sometimes you must do a risky task which may do harm to you.	0.612
A prompt action is crucial in case of emergency.	0.554
Factor 3: Experience of patient's death	
Having faced a patient hovering between life and death.	0.819
Having faced the death of a patient in your charge.	0.801
A patient failed to meet his/ her family on his/ her death.	0.723
Having faced a patient with no hope of recovery.	0.584

Note: All items were rated on a four-point Likert-type scale (1=not at all to 4=a great deal).

Table 3. Means, standard deviations, and chronbach's Alpha for 9 job stress scales in 811 female nurses

Scales (number of items)[a]	Mean	SD	Range	α
Job overload (4)	15.2	3.7	4 – 20	0.87
Job control (16)	40.5	11.7	16 – 80	0.93
Job reward (4)[b]	12.1	2.3	4 – 16	0.84
Supervisor support (4)	14.9	3.5	4 – 20	0.86
Coworker support (4)	16.5	2.9	4 – 20	0.84
Responsibility for patient's life (5)[b]	18.6	1.9	5 – 20	0.74
Experience of patient's death (4)[b]	10.1	2.8	4 – 16	0.81
Depression (20)	17.1	9.3	0 – 60	0.85
Job satisfaction (4)	9.1	1.8	4 – 13	0.73

[a]Job overload was measured by Quinn et al's (1971) scale; job control was measured by Ganster's (1984) scale; supervisor support, coworker support and job satisfaction were measured by Caplan et al's (1975) scales; depression was measured on CES-D (1977).
[b]Originally developed by the author.

Table 4. Partial correlation coefficients of job stress factors with depression and job satisfaction in 811 female nurses with confounding factors[a] controlled for

Job stress factors	Partial correlation coefficient	
	Depression	Job satisfaction
Job overload	.16***	-.12**
Job control	-.11**	.14***
Job reward	-.20***	.44***
Job strain (= job overload/ job control)	.18***	-.16***
Effort/reward imbalance (= job overload/ job reward)	.26***	-.37***
Supervisor support	-.26***	.25***
Coworker support	-.23***	.16***
Responsibility for patient's life	.07*	.05
Experience of patient's death	.07*	-.10**

*P<.05; **P<.01; ***P<.001.
[a]age, marital status and working schedule.

Table 5. Comparison of means of job stress factor scores between two levels of accidents in 811 female nurses by ANCOVA

Job stress factors	Accident in 6 months[a]		F
	No (n=742)	Yes (n=69)	
Job overload	15.2	15.9	2.47
Job control	40.6	39.6	0.51
Job reward	12.1	11.8	1.40
Job strain (= job overload/job control)	0.41	0.43	1.35
Effort/reward imbalance (= job overload/ job reward)	1.31	1.40	1.79
Supervisor support	15.0	13.9	6.05*
Coworker support	16.6	15.8	5.40*
Responsibility for patient's life	18.5	19.0	4.46*
Experience of patient's death	10.0	10.6	2.85

* P< .05

[a] means controlling for age, marital status and working schedule.

Table 6. Mean scores of depression and job satisfaction scores by job stress model with confounding factors[a] controlled for

Combination of job stress factors	n	Mean scores	
		Depression	Job satisfaction
Demand—control model:			
Low job overload + high control	245	15.7	9.4
Low job overload + low control	244	16.6	9.1
High job overload + high control	160	17.6	9.0
High job overload + low control	162	19.5	8.8
		F=6.02*** df=3	F=4.53** df=3
Multiple R		0.26	0.29
R square		0.07	0.08
Effort/ reward imbalance model:			
Low job overload + high reward	331	15.1	9.6
Low job overload + low reward	158	18.4	8.4
High job overload + high reward	216	17.2	9.4
High job overload + low reward	106	21.3	7.9
		F=14.55*** df=3	F=42.56*** df=3
Multiple R		0.31	0.44
R square		0.10	0.19

**P<.01; ***P<.001.
[a]age, marital status and working schedule.

Table 7. Analysis of covariance of job stress factors by job stress model with confounding factors[a] controlled for

Job stress factors	Depression		Job satisfaction	
	F	df	F	df
Demand—control model:				
Job overload	13.65***	1	7.73**	1
Job control	3.79	1	4.71*	1
Job overload × Job control	0.61	1	1.14	1
Multiple R	0.26		0.28	
R square	0.07		0.08	
Effort/ reward imbalance model:				
Job overload	13.75***	1	8.28**	1
Job reward	29.16***	1	118.11***	1
Job overload × job reward	0.41	1	0.75	1
Multiple R	0.31		0.44	
R square	0.10		0.19	

*$P<.05$; **$P<.01$; ***$P<.001$.
[a] age, marital status and working schedule.

Table 8. Association of job stress factors with depression and job satisfaction by multiple linear regression analysis, and with accidents on the job by logistic regression analysis

Job stress factors	Depression[a]	Job satisfaction[a]	Accidents[b]
Age	-0.182***	0.120**	-0.025
Marital status (unmarried /married)	0.048	-0.120**	0.019
Working schedule (shift/ non-shift)	0.006	-0.003	-0.643
Job overload	0.130**	-0.098**	0.035
Job control	-0.034	0.032	-0.000
Job reward	-0.149***	0.395***	-0.050
Supervisor support	-0.159**	0.127**	-0.058
Coworker support	-0.114**	0.007	-0.063
Responsibility for patient's life	0.080*	0.018	0.180*
Experience of patient's death	0.062	-0.140***	0.055
Multiple R	0.42	0.54	0.26
R square	0.18	0.29	0.07[c]

*P<.05; **P<.01; ***P<.001.
[a]Standardized regression coefficients for depression and job satisfaction.
[b]Regression coefficients for accidents.
[c]Nagelkerke R square

Appendix 1.

「尺度名：量的労働負荷(Job overload)」
　次のようなことがあなたの仕事でどのくらいの頻度で起きるかお答え下さい。
　　　　　　　　　[1]ほとんどない　[2]たまに　[3]ときどき　[4]しばしば　[5]よくある

1. 非常に速く働かなければならないこと	[1]　[2]　[3]　[4]　[5]
2. とても一生懸命働かなければならないこと	[1]　[2]　[3]　[4]　[5]
3. 時間がなくて仕事を処理しきれないこと	[1]　[2]　[3]　[4]　[5]
4. 非常にたくさんの仕事をしなければならないこと	[1]　[2]　[3]　[4]　[5]

「尺度名：コントロール(Job control)」
　現在あなたが仕事の上でどのくらいの影響力〈裁量権〉があるかをお尋ねします。影響力とは、
　他の人の仕事を指示する権限や、自分の仕事を決める自由がどの程度あるかを意味します。
　次の各項目に対してどのくらい影響力があるかお答え下さい。
　　　　　　　　　[1]ほとんどない　[2]あまりない　[3]まあまあ　[4]たくさん　[5]非常にたくさん

1. 自分の仕事の種類への影響力	[1]　[2]　[3]　[4]　[5]
2. 自分の仕事に必要な消耗品や備品を手に入れることへの影響力	[1]　[2]　[3]　[4]　[5]
3. 自分の仕事の順序への影響力	[1]　[2]　[3]　[4]　[5]
4. 自分の仕事の量への影響力	[1]　[2]　[3]　[4]　[5]
5. 自分の仕事のペース（どのくらい速くあるいはゆっくり働くか）への影響力	[1]　[2]　[3]　[4]　[5]
6. 自分の仕事の質への影響力	[1]　[2]　[3]　[4]　[5]
7. 自分の作業場所での物の配置や飾りつけへの影響力	[1]　[2]　[3]　[4]　[5]
8. あなたの職場で誰がどの作業をするかの決定への影響力	[1]　[2]　[3]　[4]　[5]
9. 自分の勤務時間または勤務スケジュールへの影響力	[1]　[2]　[3]　[4]　[5]
10. あなたの職場としていつまでに仕事をするかの決定への影響力	[1]　[2]　[3]　[4]　[5]
11. あなたの職場での仕事の方針、手順、達成度への影響力	[1]　[2]　[3]　[4]　[5]
12. 自分の仕事に必要な薬品、材料を手に入れることへの影響力	[1]　[2]　[3]　[4]　[5]
13. あなたの職場の構成員の教育・訓練に対する影響力	[1]　[2]　[3]　[4]　[5]
14. あなたの職場の机・いすや調度品やその他の機器を置く場所への影響力	[1]　[2]　[3]　[4]　[5]
15. 仕事を先にすすめて勤務時間中に短い休憩がとれる	[1]　[2]　[3]　[4]　[5]
16. 全体として、仕事や仕事に関連することへの影響力	[1]　[2]　[3]　[4]　[5]

「尺度名：社会的支援(Social support: supervisor support and coworker support)」
　次の人たちはあなたの仕事が楽になるように、どのくらい配慮や手助けをしてくれますか？

1. 直属の上司	[1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない
2. 職場の同僚	[1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない

次の人たちとどのくらい気軽に話ができますか？

1. 直属の上司	[1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない
2. 職場の同僚	[1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない

仕事で困ったことが起きた場合、次の人たちはどのくらい頼りになりますか?

| 1. 直属の上司 | [1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない |
| 2. 職場の同僚 | [1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない |

次の人たちは、あなたの個人的な問題を相談したら、どのくらい聞いてくれますか?

| 1. 直属の上司 | [1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない |
| 2. 職場の同僚 | [1]非常に　[2]多少　[3]少し　[4]全くない　[5]そういう人はいない |

「尺度名：看護婦固有のストレッサー(Nursing-related stressor)」
以下の文章はあなたの仕事にどれくらいあてはまるかお答え下さい。

　　[1]大いにあてはまる　[2]どちらかといえばあてはまる　[3]どちらかといえば違う　[4]全く違う

1. 医療事故の防止のため、何度も確認が必要である	[1]　[2]　[3]　[4]
2. 常に注意を払わなければ事故が起こる可能性がある	[1]　[2]　[3]　[4]
3. 自分自身の身に危険がある仕事をする	[1]　[2]　[3]　[4]
4. 対応の仕方などのミスで患者に悪影響を及ぼす	[1]　[2]　[3]　[4]
11. 急変時に即座に対応しなければならない	[1]　[2]　[3]　[4]
25. 自分の受け持っている患者が死亡する	[1]　[2]　[3]　[4]
26. 患者が生死をさまよっている状況に出くわす	[1]　[2]　[3]　[4]
27. 患者の死に家族が間に合わない	[1]　[2]　[3]　[4]
28. 治療しても症状が改善されない患者と接する	[1]　[2]　[3]　[4]
32. 自分の能力が発揮できる仕事である	[1]　[2]　[3]　[4]
33. やりがいのある仕事をしている	[1]　[2]　[3]　[4]
34. 誇りがもてる仕事をしている	[1]　[2]　[3]　[4]
35. 自分のした仕事で患者や家族から感謝されることがある	[1]　[2]　[3]　[4]

「尺度名：業務上の事故(Accidents)」

| 1. 過去6カ月間に、あなたは何か仕事上の事故（ケガ、業務上の災害）にあいましたか? | [1]はい　[2]いいえ |

「基本的属性」

1. あなたの性別は?	[1]女性　　　　[2]男性
2. あなたの年齢は何歳ですか?（満年齢）	□□ 歳
3. あなたの現在の婚姻状態は?	[1]既婚　　[2]未婚　　[3]離婚　　[4]死別
4. 現在の病院に勤めてどのくらいですか?（1カ月未満は切り上げ）	□□ 年 □□ カ月
5. あなたの現在の勤務形態に最も近いものを選んで下さい。	
[1]日中の勤務のみ　[2]1日2交替制　[3]1日3交替制　[4]準夜勤のみ　[5]深夜勤のみ　[5]その他（　　　　　　　　　　　　　　）	

「尺度名：抑うつ(Depression)」
この1週間のあなたのからだや心の状態についてお聞きします。各々のことがらについて、
　もしこの1週間で全くないか、あったとしても1日もつづかない場合は[0]、週のうち1～2日
　なら[1]、週のうち3～4日なら[2]、週のうち5日以上なら[3]、のところを○でかこんで下さい。

	[0] まれにあるいは なかった （1日未満）	[1] いくらか （1～2日）	[2] たまにあるいは ある程度の時間 （3～4日）	[3] ほとんどあるいは 全ての時間 （5～7日）

　　　　　　　　　[0]1日未満　[1]1～2日　[2]3～4日　[3]5日以上

1. 普段は何でもないことが煩わしい。	[0]	[1]	[2]	[3]
2. 食べたくない。食欲が落ちた。	[0]	[1]	[2]	[3]
3. 家族や友達からはげましてもらっても、気分が晴れない。	[0]	[1]	[2]	[3]
4. 他の人と同じ程度には、能力があると思う。	[0]	[1]	[2]	[3]
5. 物事に集中できない。	[0]	[1]	[2]	[3]
6. ゆううつだ。	[0]	[1]	[2]	[3]
7. 何をするのも面倒だ。	[0]	[1]	[2]	[3]
8. これから先のことについて積極的に考えることができる。	[0]	[1]	[2]	[3]
9. 過去のことについてくよくよ考える。	[0]	[1]	[2]	[3]
10. 何か恐ろしい気持がする。	[0]	[1]	[2]	[3]
11. なかなか眠れない。	[0]	[1]	[2]	[3]
12. 生活について不満なくすごせる。	[0]	[1]	[2]	[3]
13. 普段より口数が少ない。口が重い。	[0]	[1]	[2]	[3]
14. 一人ぼっちで寂しい。	[0]	[1]	[2]	[3]
15. 皆がよそよそしいと思う。	[0]	[1]	[2]	[3]
16. 毎日が楽しい。	[0]	[1]	[2]	[3]
17. 急に泣きだすことがある。	[0]	[1]	[2]	[3]
18. 悲しいと感じる。	[0]	[1]	[2]	[3]
19. 皆が自分を嫌っていると感じる。	[0]	[1]	[2]	[3]
20. 仕事が手につかない。	[0]	[1]	[2]	[3]

「尺度名：職務満足感(Job satisfaction)」
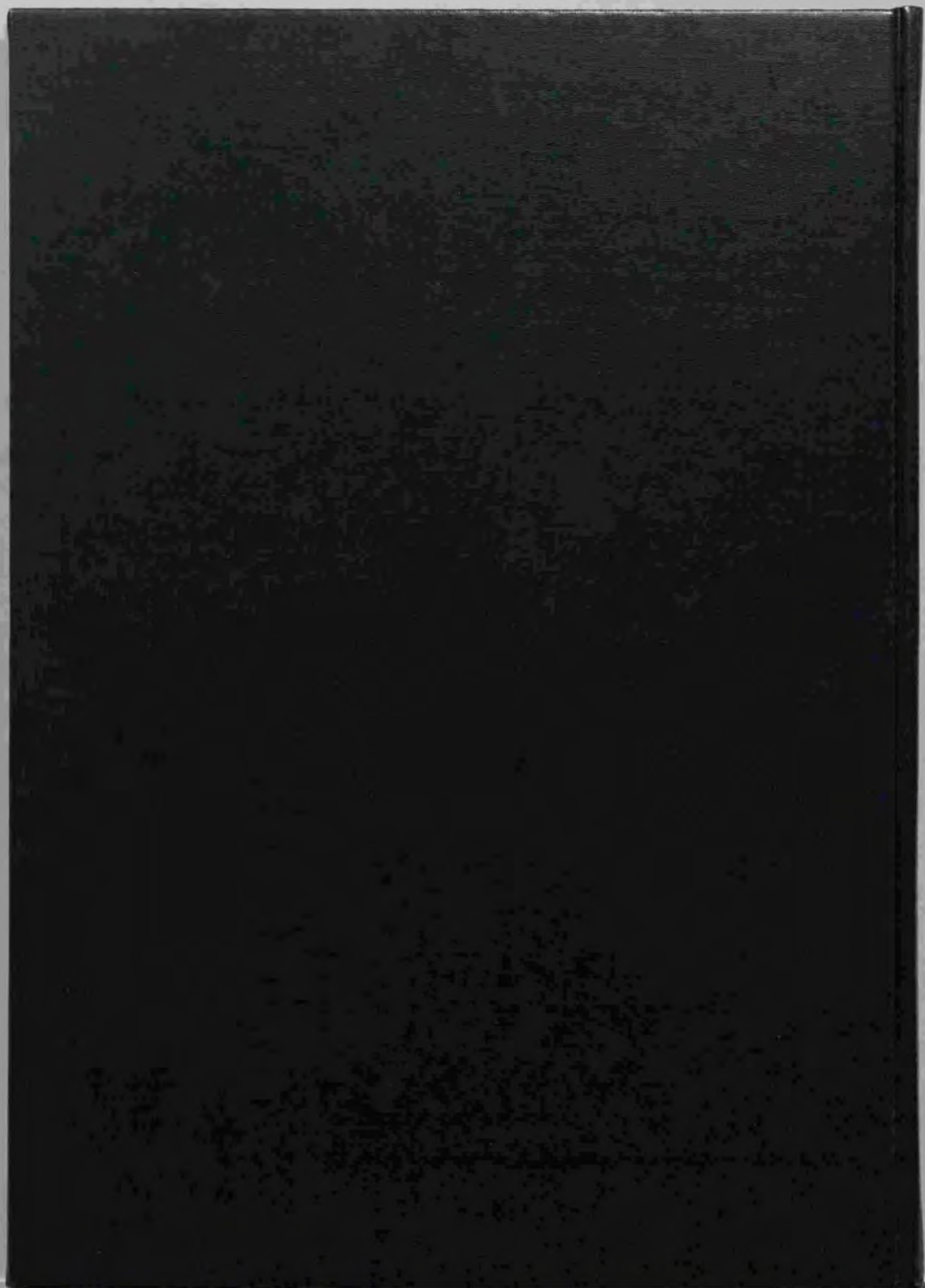　あなたのしている仕事について考えて下さい。

1. もしあなたが今の仕事をもう一度やるかどうか決めなければならないとしたらどうしますか？ わかる範囲でお答え下さい。 [1]ためらいなく同じ仕事に つくと決める　　[2]他の仕事についても考える　　[3]この仕事には絶対に つかないと決める
2. もし今あなたが仕事を何でも自由に選べるとしたら、どうしますか？ [1]同じ仕事につく　　　[2]違う仕事につく　　　[3]働きたいとは思わない
3. もし、あなたの友人があなたのような仕事をしたいと話したら、あなたはその人に何と言うで しょうか？ [1]強く勧める　　　[2]勧めるかどうか迷う　　　[3]止めるように助言する
4. 全体として、自分の仕事にどのくらい満足していると言えますか？ [1]非常に 満足している　[2]いくらか 満足している　[3]あまり 満足していない　[4]全く 満足していない

Appendix 2.

尺度得点の算出方法

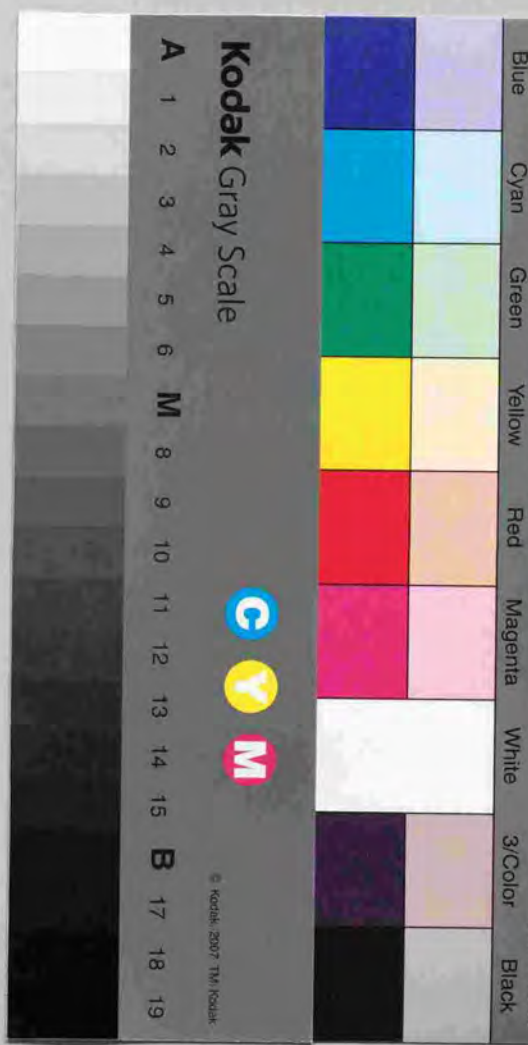| 尺度名	尺度項目
Job overload	Caplan et al. (1975)
量的労働負荷	1,2,3,4,
Job control	Ganster (1984)
仕事のコントロール	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
Social support	Caplan et al. (1975)
社会的支援	
社会的支援（上司）	1,4,7,10
社会的支援（同僚）	2,5,8,11
Job satisfaction	Caplan et al. (1975)
職務満足感	-1,-2,-3,-4
Depression	NIMH CES-Depression Scale (1977)
抑うつ	1,2,3,-4,5,6,7,-8,9,10,11,-12,13,14,15,-16,17,18,19,20
Psychological job reward	original scale
心理的報酬	-32,-33,-34,-35
Responsibility for patient's life	original scale
人命への責任	-1,-2,-3,-4,-11
Experience of patient's death	original scale
患者の死の経験	-25,-26,-27,-28

注）項目の回答番号の合計が各尺度の得点である。尺度項目で番号にマイナスがついているものは反転項目である。-1 は、1 番の項目が反転項目であることを示す。反転項目では、回答番号が 1,2,3,4,5 の場合は、5,4,3,2,1 と得点を反転させる。

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