Impacts of Job Stress and Cognitive Failure on Patient Safety Incidents among Hospital Nurses

Young-Mi Park¹, Souk Young Kim²,*

¹ Eulji University Hospital, Daejeon, Korea
² School of Nursing, Eulji University, Daejeon, Korea

Article history: Received 24 July 2013 Received in revised form 22 October 2013 Accepted 28 October 2013

Keywords: hospitals patient safety psychological stress

ABSTRACT

Background: This study aimed to identify the impacts of job stress and cognitive failure on patient safety incidents among hospital nurses in Korea.

Methods: The study included 279 nurses who worked for at least 6 months in five general hospitals in Korea. Data were collected with self-administered questionnaires designed to measure job stress, cognitive failure, and patient safety incidents.

Results: This study showed that 27.9% of the participants had experienced patient safety incidents in the past 6 months. Factors affecting incidents were found to be shift work (odds ratio (OR) = 6.85), cognitive failure (OR = 2.92), lacking job autonomy (OR = 0.97), and job instability (OR = 1.02).

Conclusion: Patient safety incidents were affected by shift work, cognitive failure, and job stress. Many countermeasures to reduce the incidents caused by shift work, and plans to reduce job stress to reduce the workers’ cognitive failure are required. In addition, there is a necessity to reduce job instability and clearly define the scope and authority for duties that are directly related to the patient’s safety.

© 2013, Occupational Safety and Health Research Institute. Published by Elsevier. All rights reserved.

1. Introduction

In modern society, duties at a hospital organization are changing even more intricately with continued advancement in therapeutic skills in a departmentalized organization, patients frequently coming in and out of hospital, and demands for the best possible service.

Nurses, forming the majority of hospital personnel, are not only forced to be always personable based on hospital policy, putting customer satisfaction first, but they are also expected to provide high-quality nursing service. They need to put in many hours to learn ever-changing medical techniques; duties include dealing with nursing clients and hospital staff in other occupations, and they are the guardians of patients for the greatest amount of time during treatment. Such characteristics of duty can increase a nurse’s job stress and cause them to have higher levels of stress than other occupations [1].

Job stress has an effect on a person’s well-being, including cognitive, psychological, physiological, and behavioral aspects. In highly stressful conditions, stress occupies the brain’s memory of an task [2], leading to a lowered mental concentration [3]. Chronic stress causes damage to the cerebral structures such as hippocampus which can be accompanied by difficulties in cognitive functions [4]. These can increase error rates in duties and lead to an accident [2].

Usually, accidents occur as a result of lack of selective attention, mental error, or wrong cognition/attention such as distraction [5], whereas patient safety incidents in a hospital include all kinds of errors, mistakes, and accidents occurring in a hospital.

Referring to the mechanism of stress that increases the danger of accidents, Reason [6] maintains that stress factors affect a person’s pattern of cognition, increasing the ratio of absentmindedness and simultaneously resulting in the performance of an improper strategy in dealing with a stressful situation. Such a situation is called cognitive failure, an example of which might be being unable to remember the name of a familiar person instantly, or making an error such as throwing a piece of candy into a wastebasket and putting its wrapper in one’s mouth [7]. These
kinds of acts occur in performing well-practiced tasks that hardly need careful attention, such as paying for an item and then leaving the shop carrying the bag that contains it [8].

Nurses are considered to carry higher job stress compared with other occupations, and thus have a high likelihood for cognitive failure, which may lead to patient safety incidents. However, studies on cognitive failure so far [2,9–14] have been chiefly on manufacturing or railway workers, college students, and general office workers, except for a single study regarding Swiss nurses [15].

Therefore, this study aims to examine the level of job stress and cognitive failure among hospital nurses and analyze their impacts on patient safety incidents for future use as basic data in promoting the safety of patients.

2. Materials and methods

2.1. Study design

This is a descriptive correlation study attempting to grasp the level of job stress, cognitive failure, and patient safety incidents among hospital nurses and to verify the predictor variables of incidents.

2.2. Sample and setting

The participants of this study are nurses working in five general hospitals located in Daejeon and Chungcheong provinces in Korea and with over 6 months of clinical experience, which was sampled by convenience from each hospital.

Participant numbers were calculated using G*Power 3.1.3, which is a sample-size estimating program. The minimum sample size required was calculated as 261 people, considering a significance level of 0.05, effect size of 0.10, and power of 0.8 for inclusion of 28 independent variables. After a total of 300 copies of questionnaire were handed out considering wastage rates, 299 copies were collected, of which a total of 279 copies were used for analysis after excluding inappropriate ones. The response rate was 99.7%.

2.3. Instruments

2.3.1. Job stress

Job stress was measured through the Short Form of the Korean Occupational Stress Scale (SF-KOSS) developed by Chang et al [16] by inclusion of the “physical environment” sphere for KOSS.

The subarea of this tool was composed of eight areas and it included 27 question items: physical environment (n = 3), job demand (n = 4), lack of job autonomy (n = 4), relational conflict (n = 3), job instability (n = 2), organizational system (n = 4), improper reward (n = 3), and work culture (n = 4). For each item, job stress was measured on a Likert 4-point scale with the following equivalents: strongly disagree (1), disagree (2), agree (3), and strongly agree (4) in inverse conversion for positive items. Job stress points were calculated by converting them into 100 full marks by subarea, with higher scores signifying more job stress. Cronbach’s of SF-KOSS was 0.84 in this study.

2.3.2. Cognitive failure

For cognitive failure, the Workplace Cognitive Failure Scale developed by Wallace and Chen [11] was used. After obtaining permission to use the scale from J. Craig Wallace in advance through an e-mail, this research team translated it into Korean. The scale was used in this study after it was reviewed for expression and translation by a professor currently teaching English at a college.

The subarea of this tool is composed of three areas (15 items), including memory (n = 5), attention (n = 5), and action (n = 5). Memory refers to failure to remember a familiar duty and related information, whereas attention refers to failure to focus one’s attention on a duty. Action refers to failure to perform proper acts in the way they are intended and suited for a purpose in a person’s engagement. Each item is evaluated on a Likert 5-point scale as follows: “Nothing” (1), “Rare” (2), “Sometimes” (3), “Often” (4), and “Very frequent” (5), with a higher point meaning higher failure of cognition. In this study, Cronbach α for this tool was 0.90.

2.4. Patient safety incidents

Out of the question items for patient safety incidents translated by Kim et al [17] from the questionnaire on the Hospital Survey on Patient Safety Culture developed by the Agency for Healthcare Research and Quality in the United States, the first item on frequently reported incidents was used for the answer choices for this study. The question inquired whether one made a mistake that could harm the patient in the past 6 months. The modified answer choices were composed of “Never,” “Several times in 6 months,” “Several times in a month,” “Several times in a week,” and “More than once in a day.”

2.5. Personality type

Personality was also measured because the researcher thought the participant’s personality can have an effect on cognitive failure and incidents. Personality was measured using the Heart-Type A scale adapted by Chang and Kang [18] from the questionnaire for behavioral type developed by Girdano et al [19]. This tool comprises 10 items with a Likert scale including the responses “Always so” (4), “Often so” (3), “Not so” (2), and “Never so” (1). By summing the marks for each item, a total of 24 marks or over was designated an A-type personality and 23 marks or under a B-type personality. Cronbach α of the scale was 0.77 in the study.

2.6. Data-collection procedures

Data were collected through a self-administered survey from August 23 to September 25, 2011, under approval from the Institutional Review Board (Eulji University) in July 2011 (EU 11-27).

For the purpose of data collection, the researcher visited the nursing section of the target hospital and explained the purpose of the study, received permission, and then conducted the survey through persons in charge of each ward. The questionnaire explained the purpose of the study and stated the participant’s rights, with no use for collected data other than the study purpose, and that the data was handled anonymously. Participants in the study were asked for a prior written consent with signature.

2.7. Data analysis

Data were analyzed using PASW Statistics 18. The participants’ general characteristics, job stress, cognitive failure, and yes or no incidents were analyzed with descriptive statistics including frequency, percentage, mean, standard deviation, etc. To determine the correlation between the participants’ general characteristics and incidents, the Chi-square test was performed. The difference in job stress and cognitive failure between the incident group and the no incident group was analyzed using a t test. The correlation among job stress, cognitive failure, and incidents was analyzed using Pearson correlation coefficients. To analyze the factors influencing incidents, multivariate logistic regression analysis was performed.
### 3. Results

#### 3.1. General characteristics of participants

Table 1 shows the participants’ ratio of experiencing patient safety incidents. The question about doing harm to patients by mistake in the past 6 months was answered with “Never” (72.1%), “Once in 6 months” (24.7%), “Once in a month” (2.5%), and “More than once in a day” (0%).

The general characteristics of the participants are shown in Table 2. A total of 97.5% of them were female, most (50.9%) were in their 20s, with their average age being 31.3 years. The majority was unmarried (59.2%) and 56.1% had religion. For personality type, 62.7% were Type A and 37.3% were Type B. For clinical experience, most (37.3%) had over 10 years’ experience and a mean duration of 9.0 (±8.6) service years. With regard to position, most were registered general nurses (78.9%), with 75.3% of them working on a shift duty instead of a fixed duty.

To investigate the relation between participants’ general characteristics and incidents, the Chi-square test was performed by classifying participants into those who had experienced incidents and those who had not in the past 6 months (Table 2). This yes or no classification showed a statistically significant relation with the participant’s age, marital status, clinic years, position, and shift of duty. As for age, participants in their 20s who had experienced incidents (37.3%) outnumbered those in their 40s (20.9%) or 30s (17.1%). Further, more incidents were found among unmarried (34.1%) compared with married (19.5%) individuals. As for clinical experience, participants with less than 3 years’ experience (50.0%) were shown to be involved in more incidents than other groups, whereas general nurses had a higher rate of incidents (31.4%) than participants acting as a charge nurse or a head nurse. In addition, the incident rate was shown to be higher among participants with a shift duty instead of a fixed duty.

Experience of incidents showed no statistically significant relations as to gender, religion, education, and ward in duty or personality type.

#### 3.2. Comparison of all variables between the incident group and the no incident group

Levels of job stress and cognitive failure were compared between the incident group and the no incident group (Table 3). Among the subareas of job stress, the only one showing a statistically significant difference was job instability between the incident group (46.37) and the no incident group (39.55) out of a score of 100.

As to cognitive failure, both subareas and total score showed a significant difference; that is, in all subareas an incident group showed higher marks compared with a no incident group.

#### 3.3. Correlation among job stress, cognitive failure, and patient safety incidents

Table 4 shows the results of analyzing correlations among job stress, cognitive failure, and incidents. Incidents correlate significantly with such subareas for job stress as job instability ($r = 0.143$), relational conflict ($r = 0.118$), and total score of job stress ($r = 0.217$), as well as such subareas for cognitive failure as memory ($r = 0.217$), attention ($r = 0.266$), action ($r = 0.230$), and total score of cognitive failure ($r = 0.275$).

### Table 1

**Patient safety incidents (N = 279)**

| Response | n (%) | Incident group (n = 78) | No incident group (n = 201) | $\chi^2$ | p |
|----------|-------|-------------------------|-----------------------------|----------|---|
| Did you make a mistake that could harm a patient in the past 6 months | | | | | |
| Never | 201 (72.1) | 77 (28.3) | 195 (71.7) | 0.75 | 0.384 |
| Several times in 6 months | 69 (24.7) | 53 (37.3) | 89 (44.3) | 13.12 | 0.001 |
| Several times in a month | 7 (2.5) | 16 (17.1) | 78 (38.3) | 34 (17.1) | 0.001 |
| Several times in a week | 2 (0.7) | 9 (20.9) | 34 (17.1) | 34 (17.1) | 0.001 |
| More than once in a day | 0 (0) | 22 (19.5) | 91 (45) | 7.34 | 0.007 |

### Table 2

**Differences in patient safety incidents according to participant characteristics**

| Variables | Category | n (% | Incident group (n = 78) | No incident group (n = 201) | $\chi^2$ | p |
|-----------|----------|-------|-------------------------|-----------------------------|----------|---|
| Gender | F | 272 (97.5) | 77 (28.3) | 195 (71.7) | 0.75 | 0.384 |
| | M | 7 (2.5) | 1 (14.3) | 6 (85.7) | | |
| Age (y) | 20–29 | 142 (50.9) | 53 (37.3) | 89 (62.7) | 11.278 | 0.001 |
| | 30–39 | 94 (33.7) | 16 (17.1) | 78 (38.3) | | |
| | ≥ 40 | 43 (15.4) | 9 (20.9) | 34 (17.1) | | |
| Marital status | Married | 113 (40.8) | 22 (19.5) | 91 (45) | 7.34 | 0.007 |
| | Unmarried | 164 (59.2) | 56 (34.1) | 108 (55.9) | | |
| Religion | Have | 156 (56.1) | 37 (23.7) | 119 (59.3) | 2.79 | 0.094 |
| | None | 122 (43.9) | 40 (32.8) | 82 (40.7) | | |
| Educational status | College and associate degree | 124 (44.4) | 39 (31.5) | 85 (42.3) | 2.30 | 0.316 |
| | Bachelor’s degree | 85 (30.5) | 24 (28.2) | 61 (30.3) | | |
| | Graduate school | 70 (25.1) | 15 (21.4) | 55 (27.4) | | |
| Clinical experience (y) | < 3 | 54 (19.4) | 27 (50.0) | 27 (50.0) | 18.15 | <0.001 |
| | 3–5 | 51 (18.3) | 14 (27.5) | 37 (18.4) | | |
| | 5–10 | 70 (25.1) | 19 (27.1) | 51 (25.4) | | |
| | ≥ 10 | 104 (37.3) | 18 (17.3) | 86 (42.7) | | |
| Job position | Staff nurse | 220 (78.9) | 69 (31.4) | 151 (75.3) | 7.440 | 0.024 |
| | Charge nurse | 28 (10.0) | 3 (10.7) | 25 (12.4) | | |
| | Head nurse | 31 (11.1) | 6 (19.4) | 25 (12.4) | | |
| Shift duty | Shift duty | 210 (75.3) | 69 (32.9) | 141 (69.9) | 11.278 | 0.001 |
| | Fixed duty | 69 (24.7) | 9 (13.0) | 60 (29.4) | | |
| Ward | General ward | 195 (69.9) | 61 (31.3) | 134 (66.7) | 4.633 | 0.201 |
| | Operating room | 22 (7.9) | 3 (13.6) | 19 (9.5) | | |
| | Critical care unit | 29 (10.4) | 7 (24.1) | 22 (11.0) | | |
| | Others | 33 (11.8) | 7 (21.2) | 26 (13.0) | | |
| Personality type | A type | 175 (62.7) | 51 (29.1) | 124 (61.4) | 0.330 | 0.566 |
| | B type | 104 (37.3) | 27 (26.0) | 77 (38.6) | | |
autonomy and job instability become higher, the ratios of incidents turn out to be shift in duty, cognitive failure, lack of job autonomy, and job instability. As to shift in duty, the odds ratio (OR) for shift in duty was 6.97 (CI: 1.73–27.92), meaning that the higher the cognitive failure, the higher the rate of incidents. The OR for lack of job autonomy was 0.97 (CI: 0.94–0.99), whereas that for job instability was 1.00 (CI: 1.00–1.04), revealing that as job autonomy and job instability become higher, the ratios of incidents are also higher.

### 3.4. Predictors of incidents

Table 5 shows the results of multivariate logistic regression using the dependent variables of the participants experiencing patient safety incidents and the independent variables of age, marital status, education, clinical experience, job position, shift in duty (general characteristics), subareas of job stress, and cognitive failure. Variables that have a significant effect on incidents turned out to be shift in duty, cognitive failure, lack of job autonomy, and job instability as a subarea of job stress. As to shift in duty, the odds ratio (OR) on ones for shift duty was 6.85 [confidence interval (CI): 1.72–27.21], which is significantly higher than that for fixed duty. The OR for cognitive failure was 2.92 (CI: 1.44–5.81), meaning that the higher the cognitive failure, the higher the rate of incidents. The OR for lack of job autonomy was 0.97 (CI: 0.94–0.99), whereas that for job instability was 1.02 (CI: 1.01–1.04), revealing that as job autonomy and job instability become higher, the ratios of incidents are also higher.

### 4. Discussion

Of the hospital nurses who participated in this study, 72.1% responded that they had never made an error causing harm to patients in the past 6 months. The remaining 27.9% of those who experienced patient safety incidents were divided as follows: “Once in 6 months” (24.7%), “Once in a month” (2.5%), “Once in a week” (0.7%), and “More than once in a day” (none). It is hard to apply this result for hospital nurses in general, but it still has significance in the sense of a general understanding of the current condition of patient safety incidents among Korea’s hospital nurses. Considering their occupation deals with the life of patients, this is not to be overlooked; rather, it calls on the development of preventive solutions for the safety of patients.

In this study, variables that have a significant effect on incidents are shift work, cognitive failure, job instability, and lack of job autonomy.

Shift workers showed a 6.97 times (CI: 1.73–27.92) higher possibility of experiencing such incidents compared with those with fixed working hours. This agrees with results of previous studies [20,21], which reported a significantly higher rate of incidents in shift workers than in nonshift workers in manufacturing industries. Shift work is considered to influence the worker’s health and the safety of those who depend on her (or him) in both the short and long term by adversely affecting cycles of physiological rhythm and activity. This necessitates more research on plans and their application to practice to reduce the incident rates of shift workers. For this purpose, Rosa et al [22] proposes devising a schedule to adopt physiological rhythm quickly, adjust rest/sleep schedules as well as outside stimuli such as illumination, negotiation, and improving physical activity for overcoming fatigue.

The OR of cognitive failure turned out to be 2.96 (CI: 1.48–25.92), meaning that the higher the cognitive failure, the higher the rate of patient safety incidents. This result agreed with previous studies [2,23], which reported a significant correlation between cognitive failure and accidents. Melamed et al [24] maintained that a confusing environment for one’s job or work tends to distract a worker, which causes her/him less attention to danger clues, subsequently increasing the rates of accidents. This means that an effort to reduce cognitive failure should be preceded by finding a plan to lower job stress. Actually, at a scene in a ward, it can easily

### Table 3

| Variables                          | Incident group (n = 78) | No incident group (n = 201) | t    | p     |
|-----------------------------------|------------------------|----------------------------|------|-------|
|                                   | M (SD)                 | M (SD)                     |      |       |
| Job stress (total)                | 51.04 (9.80)           | 48.95 (9.04)               | −1.69| 0.092 |
| Job demand                        | 70.02 (16.92)          | 70.07 (18.09)              | −0.23| 0.816 |
| Physical environment              | 56.55 (14.68)          | 53.57 (15.47)              | −1.47| 0.143 |
| Organizational system             | 54.17 (15.93)          | 52.78 (14.94)              | −0.68| 0.495 |
| Improper reward                   | 53.70 (17.12)          | 52.68 (16.27)              | −0.46| 0.643 |
| Lack of job autonomy              | 46.47 (10.62)          | 48.22 (13.87)              | 1.00 | 0.317 |
| Work culture                      | 44.66 (16.34)          | 41.63 (15.06)              | −1.47| 0.142 |
| Job instability                    | 46.37 (18.74)          | 39.55 (18.14)              | −2.79| 0.006 |
| Relational conflict               | 35.75 (13.12)          | 33.11 (11.49)              | −1.66| 0.099 |
| Cognitive failure (total)         | 2.03 (0.48)            | 1.80 (0.44)                | −3.78| <0.001|
| Memory                            | 2.18 (0.50)            | 1.98 (0.52)                | −2.84| 0.005 |
| Attention                         | 2.10 (0.57)            | 1.85 (0.55)                | −3.32| 0.001 |
| Action                            | 1.80 (0.54)            | 1.56 (0.48)                | −3.60| <0.001|

M, mean; SD, standard deviation.

### Table 4

| Variables                          | A      | B      | C      | D      | E      | F      | G      | H      | I      | J      | K      | L      | M      | N      |
|-----------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Job demand                        | 1     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     |
| Physical environment              | 0.50† | 1     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     |
| Organizational system             | 0.30† | 0.40† | 1     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     |
| Improper reward                   | 0.31† | 0.37† | 0.64† | 1     | −     | −     | −     | −     | −     | −     | −     | −     | −     | −     |
| Lack of job autonomy              | 0.09† | 0.15† | 0.28† | 0.35† | 1     | −     | −     | −     | −     | −     | −     | −     | −     | −     |
| Work culture                      | 0.18† | 0.24† | 0.32† | 0.21† | 0.10† | 1     | −     | −     | −     | −     | −     | −     | −     | −     |
| Job instability                    | 0.31† | 0.36† | 0.26† | 0.13† | 0.01† | 0.40† | 1     | −     | −     | −     | −     | −     | −     | −     |
| Relational conflict               | 0.08† | 0.07† | 0.25† | 0.23† | 0.14† | 0.25† | 0.19† | 1     | −     | −     | −     | −     | −     | −     |
| Job stress (total)                | 0.62† | 0.67† | 0.72† | 0.68† | 0.41† | 0.57† | 0.59† | 0.43† | 1     | −     | −     | −     | −     | −     |
| Memory                            | 0.06† | 0.16† | 0.11† | 0.17† | 0.11† | 0.05† | 0.04† | 0.05† | 0.01† | 1     | −     | −     | −     | −     |
| Attention                         | 0.11† | 0.17† | 0.15† | 0.14† | 0.13† | 0.14† | 0.03† | 0.12† | 0.21† | 0.65† | 1     | −     | −     | −     |
| Action                            | 0.05† | 0.20† | 0.10† | 0.08† | 0.08† | 0.02† | 0.21† | 0.13† | 0.13† | 0.30† | 0.59† | 0.60† | 1     | −     |
| Cognitive failure (total)         | 0.08† | 0.20† | 0.14† | 0.15† | 0.12† | 0.15† | 0.07† | 0.12† | 0.08† | 0.88† | 0.84† | 0.22† | 1     | −     |
| Patient safety incidents (yes or no) | 0.01   | 0.08   | 0.04   | 0.03   | −0.06   | 0.09   | 0.17† | 0.09   | 0.10   | 0.17   | 0.20   | 0.21† | 0.22† | 1     |

A, job demand; B, physical environment; C, organizational system; D, improper reward; E, lack of job autonomy; F, work culture; G, job instability; H, relational conflict; I, job stress; J, memory; K, attention; L, action; M, cognitive failure; N, patient safety incidents.

†p < 0.001.

†p < 0.01.

†p < 0.05.
occurs that even on the way to a patient for a nursing treatment such as medication, a nurse can forget about this task after taking care of another job if a phone rings in the ward or if she/he receives a request from another patient or guardian. Therefore, it is necessary to coordinate lack of manpower and excess workload, among others. Another point is that cognitive failure is not only affected by a state such as job stress, but also it can be caused by a personal trait. Thus, in selecting a nurse who should function under an authority for decision making and using discretion on one’s job, which shows that incident rates are lower among people with less authority for decision making. Because such a result denotes that those who are in charge of a limited given duty experience lower incidents of accidents, it is necessary to define clearly the responsibility, authority, and scope for very important duties directly related to the life of patients in a ward.

In this study, regression analysis was performed with a single dependent variable of incidents. Of job stress factors, only job instability and lack of job autonomy are found to be factors having a significant effect on accidents. However, factors showing a significant correlation with cognitive failure turn out to be physical environment, lack of job autonomy, relational conflict, organizational system, improper reward, work culture, etc., all of which are subareas of job stress. This suggests that job stress factors can have an indirect effect on accidents through cognitive failure. Thus, future research will need to cover structural equation modeling to examine the direct and indirect effects of job stress on accidents by way of cognitive failure.

In conclusion, this study was aimed at exploring the impact of hospital nurses’ job stress and cognitive failure on patient safety incidents and ultimately using the result as basic data for preventing and managing patient’s safety incidents. This study showed that 27.9% of the participants had experienced such incidents in the past 6 months. Factors affecting incidents were found to be shift work, cognitive failure, job instability, and lack of job autonomy. Therefore, what we need to prepare is many countermeasures to reduce patient safety incidents caused by shift workers and plans to reduce job stress to reduce workers’ cognitive failure. Further, it is necessary to reduce job instability and clearly define the scope and authority for duties that are directly related to patient safety.

Conflicts of interest

The authors declare that they have no conflicts of interest to declare.

References

[1] Kim BH. A study on job stress and stress coping style by the personality types of clinical nurses. Daegu (Korea): Catholic University of Daegu; 2002.
[2] Lee YY. The interacting effects of cognitive failure, consciousness and job stress on safety behavior and accidents. Korean J Ind Organ Psychol 2006;19: 675–9.
[3] Kim SH. Study on life event stress influencing on physical mental state and job satisfaction of nurses; 1999.
[4] Kim S, Pyun K, Sim I. Stress and cognitive dysfunction. Korean J Stress Res 2005;13:283–8.
[5] Hansen CP. A causal model of the relationship among accidents, bio data, personality and cognitive failure factors. J Appl Psychol 1989;74:81–90.
[6] Reason JT. Human error. Cambridge [UK]: Cambridge University Press; 1990.
[7] Reason JT. Lapses of attention in everyday life. New York (NY): Academic Press; 1984.
[8] Lee JKE, Kim M, Gam K, Kim J, Park T, Kim S, Shin H, Lee K, Kim Y, Lee J, Doo K, Lee Y, Park J, Kwak H, Park C, Lee J. Cognitive psychology. Seoul (Korea): Hakjisa; 2009.
[9] Broadbent DE, Cooper PF, Fitzgerald P, Parkes KR. The Cognitive Failures Questionnaire (CFQ) and its correlates. Br J Clin Psychol 1982;21:1–16.
[10] Martin M. Cognitive failure: everyday and laboratory performance. Bull Psychol Soc 1983;21:57–100.
[11] Wallace KC, Chen C. Development and validation of work-specific measure of cognitive failure: implications for occupational safety. J Occup Organ Psychol 2005;78:615–32.
[12] Simpson SA, Wadsworth EJ, Moss SC, Smith AP. Minor injuries, cognitive failures and accidents at work: incidence and associated features. Occup Med (Lond) 2005;55:99–108.
[13] Moon KL. [A] Study of safety behavior dimension [Master Thesis]. Seoul (Korea): The Catholic University of Korea; 2009.
[14] Park CH, Kang HY. A study on the validation of cognitive failure questionnaire: case of Korean college students. Korean J Psychol Gen 2011;30:341–55.
[15] Elfering A, Grebner S, Dudan A. Job characteristics in nursing and cognitive failure at work. Saf Health Work 2011;2:194–200.

Table 5

Multivariate logistic regression: predictors of patient safety incidents

| Variables                      | Category | Patient safety incidents odds ratio (95% CI) |
|-------------------------------|----------|----------------------------------------------|
| Age (y)                       |          |                                              |
| 20–29                         | 1        |                                              |
| 30–39                         | 0.55 (0.19–1.60) |
| ≥ 40                          | 1.32 (0.26–6.73) |
| Marital Status                |          |                                              |
| Married                       | 1        |                                              |
| Unmarried                     | 0.91 (0.41–2.00) |
| Clinical experience (y)       | <3       | 1                                            |
|                               | 3–5      | 0.44 (0.18–1.07) |
|                               | ≥ 10     | 0.54 (0.13–2.21) |
| Job position                  |          |                                              |
| Staff nurse                   | 1        |                                              |
| Charge nurse                  | 0.44 (0.10–1.83) |
| Head nurse                    | 2.10 (0.31–14.16) |
| Shift duty                    |          |                                              |
| Fixed duty                    | 6.85 (1.72–27.21) |
| Job demand                    | 0.98 (0.96–1.01) |
| Physical environment          | 1.01 (0.98–1.03) |
| Organizational system         | 0.99 (0.97–1.02) |
| Improper reward               | 0.99 (0.97–1.02) |
| Lack of job autonomy          | 0.97 (0.94–0.99) |
| Work culture                  | 1.00 (0.98–1.02) |
| Job instability               | 1.02 (1.01–1.04) |
| Relational conflict           | 1.02 (0.99–1.04) |
| Cognitive failure             | 2.92 (1.47–5.81) |

CI, confidence interval. *p < 0.05.
[16] Chang S, Koh S, Kang D, et al. Developing an occupational stress scale for Korean employees. Korean J Occup Environ Med 2005;17:297–317.
[17] Kim JE, Kang MA, An KE, Song YH. A survey of nurses’ perception of patient safety related to hospital culture and reports of medical errors. J Korean Clin Nurs Res 2007;13:169–79.
[18] Chang HK, Kang SG. Stress and mental health. Seoul (Korea): Hakjisa; 1996.
[19] Girdano DA, Everly GS, Dusek DE. Controlling stress and tension: a holistic approach. 3rd ed. Upper Saddle River (NJ): Prentice Hall; 1990.
[20] Kim J. A study on the safety accidents by shift systems. Korean J Occup Med 1996;8:330–9.
[21] Symposium conducted at the meeting of the Korean Society of Occupational and Environmental Medicine Connectivity between shift work and damage during work seen from a survey of working condition. Seoul (Korea): Korean Society of Occupational and Environmental Medicine Connectivity; 2009.
[22] Rosa RR, Bonnet MH, Bootzin RR, Eastman CI, Monk T, Penn PE, Tepas DJ, Walsh JK. Intervention factors for promoting adjustment to nightwork and shiftwork. Occup Med 1990;5:391–415.
[23] Wallace JC, Vodanovich SJ. Can accidents and industrial mishaps be predicted? Investigating workplace performance. J Bus Psychol 2003;17:503–14.
[24] Melamed S, Luz J, Najenson T, Jucha E, Green M. Ergonomic stress levels, personal characteristics, accident occurrence and sickness absence among factory workers. Ergonomics 1989;32:1101–10.
[25] Hermann DJ, Yoder CY, Gruneberg M, Payne DG. Applied cognitive psychology. New York (NY): Erlbaum; 2009.