Operating-room nurses’ classifications in job satisfaction

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Abstract: Purpose: The purpose of this study was to investigate the operating environment, degree of operating-room nurses’, and to clarify the job satisfaction, experience, and emotions categorized characteristics operating-room nurses. Method: The study surveyed 1177 operating-room nurses. For 38 questionnaire items, a 5-point Likert scale was applied regarding job satisfaction, workplace environment, experiences, and emotions. Classification was performed by cluster analysis based on operating-room nurses’ job satisfaction. Results: Results of cluster analysis were classified into five groups with unique characteristics based on factors such as age, years of nursing experience, years of operating-room nursing experience, workplace environment, experience, and emotion. Conclusion: Results suggest providing support tailored to characteristics of each of the five groups to optimize their job satisfaction. J. Med. Invest. 67: 113-123, February, 2020

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INTRODUCTION

In recent years, nursing has been affected by increased numbers of patients with serious illnesses through such factors as reduced hospitalization periods, reinforced risk management, and diversification of patient needs, in addition to increasing advancement and complication of medical care (1). Greater degrees of specialist knowledge and competence in diverse techniques are required of nurses, especially those in specialist areas (2). The same holds for operating-room nursing, in which minimally invasive surgical techniques that reduce the burden on the patient’s body are often selected, resulting in clear reduction in operating times (3-5). With such striking development and expansion of medical care technologies and operating-room management methods, there is a need for management of highly profitable operating rooms (6, 7) and for utilization of specialist knowledge.

Meanwhile, training for scrub nursing, a specialist technique in operating-room nursing (8), is conducted only through manuals for nurses and individual hospitals. Including content based on nurses’ specialist experience that cannot be handled in joint training in hospitals, no systematic methods or guidelines exist for training operating-room nurses.

Operating-room nurses’ job satisfaction tends to be lower than that of ward nurses (9), which indicates the difficulty of maintaining operating-room nurses’ sense of satisfaction and worth (10, 11). Factors affecting operating-room nursing job continuity include personnel and environmental factors such as recognition, relationships, and cooperation with people other than patients (12-14). These factors are thought important in operating-room nursing job satisfaction and work environments. Furthermore, rather than limiting our scope to adjusting job satisfaction and the working environment, making adjustments according to individual needs based on operating-room and general nursing experience might be necessary.

Therefore, it is important to analyze by categorizing groups according to operating-room nursing job satisfaction, work environment, and differences in nurses’ backgrounds. The authors believed that by identifying each group’s characteristics, it would be possible to clarify support methods for enhancing nurses’ job satisfaction.

The purpose of this study was to investigate the operating environment, degree of operating-room nurses’, and to clarify the job satisfaction, experience, and emotions categorized characteristics operating-room nurses.

DEFINITION OF OPERATIONAL TERMS

Job satisfaction: The definition of “work” in operating-room nursing, according to Rhodes et al. (15), is a job position with the same duties, skills, knowledge, and responsibilities. In the present study, to confirm job satisfaction in operating rooms, using specialist characteristics of Japanese people and operating-room nurses in Japan, organizational order (16) was added to the definition of job satisfaction alongside duties, skills, knowledge, and responsibilities.

STUDY METHOD

1. Participants

Survey participants were operating-room nurses working in operating rooms at general hospitals with 100 or more beds in the Chugoku/Shikoku region of Japan.

2. Survey method

The survey questionnaire’s content was explained, in advance, to the head nurse and the head operating-room nurse at general hospitals (N = 113) within the survey’s scope, and 1523 questionnaires were distributed to the 82 hospitals that consented to participate. Nurse participants responded to questionnaires privately and anonymously, after which questionnaires were individually sealed and mailed to researchers.

3. Survey questionnaire content and time required

The following were included as nurses’ basic attributes in...
the questionnaire: age; gender; number of operating-room nurses; job type; years of nursing experience; years of operating-room nursing experience; position; hours of overtime/month; typical weekday work shifts; number of hospital beds; and number of surgical operations/year.

With regard to job satisfaction, there were seven items, namely: "the job itself and job details" with regard to duties and skills of operating-room nursing work (15); "education and training systems" with regard to knowledge (17); "ability of senior management" (17), "sense of achievement in team medical care" (17) with regard to responsibilities; as well as "work hours and work systems," "personal relationships at work," and "pay and remuneration" with regard to organizational order (16). Answers were given according to a 5-point Likert scale, with choices ranging from "Satisfied" (5 points) to "Dissatisfied" (1 point) degree of job satisfaction. Thus, a higher score indicated greater job satisfaction.

Six unique questions regarding the work environment (relating to aspects that are considered to affect operating-room work job satisfaction) were set based upon the results of surveys by Yamazaki et al. (10), Fukasawa (11), and Kitawaki et al. (14). These were: "relationships of trust with others; "obtaining consultation/cooperation"; "study, training, and career progression"; "job flexibility"; "communication"; and "pride and goals regarding specialization/the nursing profession." Answers were given according to a 5-point Likert scale, with choices ranging from "Agree" (5 points) to "Disagree" (1 point) with satisfaction of work environment. Thus, a higher score indicated that the work environment had a greater effect on job satisfaction.

Questions were set regarding the experiences and emotions of operating-room nurses while working in operating rooms. For experiences, ten unique questions were set based upon the results of a study by Hasebe (18). Answers were given according to a 5-point Likert scale, with choices ranging from "Strongly agree" (5 points) to "Strongly disagree" (1 point) with specific example. A higher score reflected a stronger influence of operating-room experiences. For emotions, 15 unique questions were set based upon the authors' experiences of operating-room work along with specific examples. The same Likert scale was used with a higher score relating to more negative emotions. The question items regarding job satisfaction, workplace environment, experiences, and emotions were all carefully selected after being checked and amended by multiple nurses with experience in operating-room nursing.

Completing the questionnaire required approximately 10–15 minutes.

4. Analytical method

Analysis tabulated the basic attributes listed above. For job satisfaction, workplace environment, experience, and emotion, the Kaiser-Meyer-Olkin (KMO) measure was used for sampling adequacy. Regarding reliability of the job satisfaction items, factor analysis was performed with Promax rotation of the main factor. Also, Cronbach's alpha was used to assess the internal consistency of question items.

Focusing on similarity of approach to satisfaction with operating-room nursing work, classifications were based on hierarchical cluster analysis according to Ward's method, and determination of cluster numbers used a dendrogram. Furthermore, we aimed to clarify characteristics of each group of cluster-classified operating-room nurses.

A chi-square test and calculated adjusted residuals was performed on age, years of nursing experience, years of operating-room nursing experience, position, monthly overtime hours, typical weekday work shifts, number of hospital beds, annual number of operations, and number of operating-room nurses. In each cluster classification, a test was conducted on differences in average values of each group according to workplace environment, nursing experiences, and nurses' emotions in the operation room. In case of Levene's test for equal variance, this study performed a one-way analysis of variance (Tukey's multiple comparison test between groups). When equal dispersion is not guaranteed a Kruskal–Wallis test (Dunn–Bonferroni's multiple comparison between groups).

In the aforementioned analyses using statistical software SPSS ver. 25, the level of significance was set at 5% or less.

5. Ethical considerations

This study was conducted with approval from the Tokushima University Hospital Medical Ethics Committee (approval number 1986-2). Oral and written explanations of the study's purpose were provided to nursing managers (head nurses), and questionnaires were distributed to facilities that had approved research cooperation. Some facilities requested application to the facility ethics committee; such application was produced, and then approval was received. The questionnaire stated the purpose and provided an explanation of the survey, which was responded to anonymously. Participation was optional. Ethical considerations were addressed by an explanatory page sent with the questionnaire, informing participants of the following: Non-participation would not incur any disadvantages; data processing and analysis would be codified so that individuals could not be identified; questionnaire responses would be stored and managed in strict confidence, shared only with researchers, and responsibly disposed of after data analysis; and consent would be obtained from participants before any related announcements at academic societies.

RESULTS

The survey was sent to 1523 individuals at 82 consenting facilities; 1277 surveys were collected (83.8%). Responses in which all questions were answered were considered valid, such that the analytical target became 1177 (valid response rate = 92.2%). Regarding the 38 items in the questionnaire, the relevance of job satisfaction, workplace environment, experience, and emotion was as high as 0.905, with KMO sampling appropriate criteria. Cronbach's alpha coefficient was 0.885, and the alpha coefficient of 4 factors (job satisfaction, workplace environment, experience, emotion) ranged from 0.825 to 0.909 (Table 1).

I. The characteristics of the participants (Table 2)

There were 258 (21.9% of total) nurses in the aged from 31–35 years, and 216 (18.9%) nurses in aged from 20–25 years. There were 980 women (83.3%) and 197 men (16.7%). 401 (34.1%) nurses had 11–20 years of experience, while 323 (27.4%) had five years or less of experience. The latter are defined by Benner as beginners that are still learning. 522 (44.4%) who had work experience of five years or less. Regarding positions, most were staff (81.2%). 603 nurses (51.2%) worked overtime for up to 11–20 hours. With regard to work patterns, the largest group among weekday work shifts comprised those who were engaged in daytime shifts and call-outs (635 people; 54.0%), followed by those engaged in two-shift systems (269 people; 22.9%). There were 486 nurses (41.3%) working in hospitals with 500–899 beds, with 341 (29.0%) working in institutions undertaking 4,001–6,000 operations per year. 329 (27.9%) worked in groups of 11–20 people.
Fig. 1 and Tables 3–7 show characteristics of the five cluster-classified groups based on job satisfaction.

Five groups were classified by using cluster analysis of job satisfaction scores via Ward's method, according to operating-room nursing job satisfaction based on a dendrogram (Fig. 1). In the five cluster-classified groups’ basic attributes (Table 3), significant differences were recognized for age (p = 0.016), years of nursing experience (p = 0.004), years of operating-room nursing experience (p = 0.025), weekday work shifts (p < 0.001), and annual number of operations (p = 0.021) (5 items). Six items of significant difference (p < 0.001) were recognized in the five cluster-classified groups’ workplace environments (Tables 4–5). For nurses’ experiences and emotions, there were 20 items of significant difference (Tables 4, 6–7). Characteristics of Groups I–V are explained below.

1) Group I (High job satisfaction and proud of being recognized)

Among the five groups, this one had the highest job satisfaction and the greatest number in the younger age range age of 20–25 years. Many had 5 years or less of experience in nursing and operating-room nursing experience; these group members were employed immediately after graduation from nursing school. Work environment and experience items were significantly higher (p < 0.001) than other groups’, and this group had significantly lower average values for the 13 items that indicate reduced emotional well-being (p < 0.001). Therefore, Group I was described as having “High job satisfaction and pride in their recognition.”

2) Group II (Somewhat high job satisfaction but the worst emotions toward doctors and coworkers)

This group had somewhat high job satisfaction; they belonged either to the age range of 20–25 years or the middle-age range of 31–35. Many had operating-room nurse experience of less than 5 years. Although the difference was not significant, this group
provided the most responses for “No clear communication with doctors” and “Resentment toward coworkers.” Therefore, Group II was described as having “Somewhat high job satisfaction but the worst emotions toward doctors and coworkers.”

3) Group III (Moderate job satisfaction and adaptable to the workplace environment)
This group had job moderate satisfaction and the highest nursing experience, 11–20 years, but for operating-room nursing experience, the highest was 5 years or less. For all items on workplace environment, their average value was moderate. No particular satisfaction or dissatisfaction was revealed in emotion. Therefore, Group III was described as having “Moderate job satisfaction and being adaptable to the workplace environment.”

4) Group IV (Dissatisfied veteran nurses with somewhat low job satisfaction)
This group had somewhat low job satisfaction. Despite having the highest ratio of “veteran” nurses with 11–20 years of experience, the group also had many with 5 years or less of operating-room nursing experience. Regarding emotion, items on “Workload that clearly exceeds my capacity (p < 0.001)” and “Always busy (p < 0.001)” were significantly higher than in other groups. Therefore, Group IV was described as “Dissatisfied veteran nurses with somewhat low job satisfaction.”

5) Group V (Dissatisfied operating-room veterans with the lowest satisfaction)

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### Table 2. Summary of participant characteristics

| Characteristic                              | Number | (%)   |
|--------------------------------------------|--------|-------|
| **Age**                                    |        |       |
| 20–25                                      | 216    | (18.4)|
| 26–30                                      | 206    | (17.5)|
| 31–35                                      | 258    | (21.9)|
| 36–40                                      | 206    | (17.5)|
| 41–46                                      | 159    | (13.5)|
| 46 or more                                 | 132    | (11.2)|
| **Gender**                                 |        |       |
| Female                                     | 980    | (83.3)|
| Male                                       | 197    | (16.7)|
| **Years of nursing experience**            |        |       |
| Less than 5                                | 323    | (27.4)|
| 5–10                                       | 249    | (21.2)|
| 11–20                                      | 401    | (34.1)|
| 21 or more                                 | 204    | (17.3)|
| **Years of operating room nursing experience** |    |       |
| Less than 5                                | 522    | (44.4)|
| 5–10                                       | 383    | (32.5)|
| 11 or more                                 | 272    | (23.1)|
| **Position**                               |        |       |
| Deputy nurse chief, Chief                  | 127    | (10.8)|
| Team leader                                | 86     | (7.3) |
| Staff                                      | 956    | (81.2)|
| Other                                      | 8      | (0.7) |
| **Hours of overtime/month**                |        |       |
| Less than 10                               | 386    | (32.8)|
| 11–20                                      | 603    | (51.2)|
| 21–30                                      | 160    | (13.6)|
| 30 or more                                 | 21     | (1.8) |
| No answer                                  | 7      | (0.6) |
| **Weekday work shifts**                    |        |       |
| 2 shift                                    | 269    | (22.9)|
| 3 three-shift                              | 130    | (11.0)|
| Day shifts and night duty                  | 44     | (3.7) |
| Day shifts and call-outs                   | 635    | (54.0)|
| Other                                      | 99     | (8.4) |
| **Number of hospital beds**                |        |       |
| 500–899                                    | 486    | (41.3)|
| 300–499                                    | 479    | (40.7)|
| 100–299                                    | 212    | (18.0)|
| **Number of surgical operations/year**     |        |       |
| 6,001 or more                              | 214    | (18.2)|
| 4,001–6000                                 | 341    | (29.0)|
| 2,001–4000                                 | 290    | (24.6)|
| Less than 2,000                            | 332    | (28.2)|
| **Number of operating room nurses**        |        |       |
| 41 or more                                 | 181    | (15.4)|
| 31–40                                      | 227    | (19.3)|
| 21–30                                      | 239    | (20.3)|
| 11–20                                      | 329    | (27.9)|
| Less than 10                               | 201    | (17.1)|
Table 3. Basic attributes of the 5 groups classified by cluster analysis

| Basic attributes | Group I | Group II | Group III | Group IV | Group V |
|------------------|---------|---------|----------|---------|---------|
|                  | Very high | Somewhat high | Moderate | Somewhat low | Low   |
|                   | satisfaction group | satisfaction group | satisfaction group | satisfaction group | satisfaction group |
| Age               | 20-25   | 26-30   | 31-35    | 36-40   | 41-45   |
|                   | 215     | 256     | 207      | 176     | 159     |
|                   | (18.4%) | (21.6%) | (17.6%)  | (14.9%) | (13.5%) |
| Years of nursing experience | Less than 5 | 5-10 | 11-20 | 21 or more | Less than 5 | 5-10 | 11-20 | 21 or more |
|                   | 373     | 349     | 401      | 204     | 373     | 383     | 212     | 272     |
|                   | (32.0%) | (29.7%) | (34.1%)  | (17.8%) | (32.0%) | (32.5%) | (23.2%) | (23.1%) |
| Years of operating room nursing experience | Less than 5 | 5-10 | 11-20 | 21 or more | Less than 5 | 5-10 | 11-20 | 21 or more |
|                   | 522     | 383     | 210      | 217     | 522     | 383     | 210     | 217     |
|                   | (44.2%) | (32.5%) | (17.2%)  | (17.2%) | (44.2%) | (32.5%) | (17.2%) | (17.2%) |
| Position          | Deputy nurse chief, OR   | Team leader | Staff   | Other   | Deputy nurse chief, OR   | Team leader | Staff   | Other   |
|                   | 127     | 95      | 957      | 22      | 127     | 95      | 957      | 22      |
|                   | (10.8%) | (7.9%)  | (81.2%)  | (1.8%)  | (10.8%) | (7.9%)  | (81.2%)  | (1.8%)  |
| Hours of overtime/week | Less than 10 | 11-20 | 21-30 | 30 or more | Less than 10 | 11-20 | 21-30 | 30 or more |
|                   | 386     | 603     | 160      | 22      | 386     | 603     | 160      | 22      |
|                   | (32.0%) | (51.2%) | (13.7%)  | (1.8%)  | (32.0%) | (51.2%) | (13.7%)  | (1.8%)  |
| Number of hospital beds | 500-499 | 300-499 | 300-499 | 300-499 | 300-499 | 300-499 | 300-499 | 300-499 |
|                   | 486     | 479     | 475      | 475     | 486     | 479     | 475      | 475     |
|                   | (41.3%) | (40.6%) | (38.8%)  | (38.8%) | (41.3%) | (40.6%) | (38.8%)  | (38.8%) |
| Number of surgical operations/year | 6,001 or more | 4,001-6,000 | 2,001-4,000 | Less than 2,000 | 6,001 or more | 4,001-6,000 | 2,001-4,000 | Less than 2,000 |
|                   | 214     | 341     | 290      | 332     | 214     | 341     | 290      | 332     |
|                   | (18.2%) | (29.0%) | (24.5%)  | (28.2%) | (18.2%) | (29.0%) | (24.5%)  | (28.2%) |
| Number of operating room nurses | 41 or more | 31-40 | 21-30 | 11-20 | Less than 10 |
|                   | 181     | 227     | 239      | 329     | 701     |
|                   | (15.4%) | (19.3%) | (20.2%)  | (27.9%) | (21.2%) |

Fig 1. Classification of participants based on job satisfaction using a cluster analysis n=1177
### Table 4: Job satisfaction, workplace environment, experience and emotions of the 5 groups classified by cluster analysis

|                      | Group I     | Group II    | Group III    | Group IV     | Group V     | One-way analysis of variance |
|----------------------|-------------|-------------|--------------|--------------|-------------|------------------------------|
|                      | Very high satisfaction group | Somewhat high satisfaction group | Moderate satisfaction group | Somewhat low satisfaction group | Low satisfaction group | n=1177                        |
|                      | n=132       | n=195       | n=324        | n=408        | n=118       |                              |
|                      | Average     | (SD)        | Average      | (SD)         | Average     | (SD)                         |
| Job satisfaction     | 4.00        | (0.326)     | 3.31         | (0.296)      | 3.03        | (0.214)                      |
|                      | 2.53        | (0.297)     | 1.91         | (0.419)      |             |                              |
|                      | 1068.37     | 0.000       |              |              |             |                              |
| Workplace environment| Relationships of trust with others | 3.34        | (0.837)     | 3.23         | (0.795)     | 3.10                          |
|                      | Obtaining consultation/cooperation | 4.38        | (0.515)     | 3.97         | (0.609)     | 3.67                          |
|                      | Study, training, and career progression | 3.95        | (0.591)     | 3.65         | (0.644)     | 3.42                          |
|                      | Job flexibility | 3.90        | (0.528)     | 3.55         | (0.652)     | 3.46                          |
|                      | Communication | 3.59        | (0.641)     | 3.41         | (0.716)     | 3.22                          |
|                      | Pride and goals regarding specialization/the nursing profession | 3.74        | (0.537)     | 3.54         | (0.662)     | 3.28                          |
|                      | Experiences  | Listened to | 4.34        | (0.686)     | 4.13         | (0.773)                      |
|                      | Recognition from doctors | 3.89        | (0.946)     | 3.87         | (0.946)     | 3.63                          |
|                      | Recognition from superiors | 4.14        | (0.722)     | 3.98         | (0.846)     | 3.69                          |
|                      | Entrusted by superior | 4.06        | (0.749)     | 3.91         | (0.813)     | 3.58                          |
|                      | Rewarded for struggle | 3.92        | (0.811)     | 3.78         | (0.836)     | 3.50                          |
|                      | Useful      | 4.08        | (0.752)     | 3.90         | (0.831)     | 3.65                          |
|                      | Casually supervised when lacking confidence | 4.39        | (0.696)     | 4.22         | (0.756)     | 4.05                          |
|                      | Given advice | 4.50        | (0.559)     | 4.28         | (0.664)     | 4.01                          |
|                      | Protected from unfounded criticism | 3.80        | (0.994)     | 3.53         | (0.986)     | 3.48                          |
|                      | Competing with colleagues | 3.14        | (1.071)     | 3.04         | (0.924)     | 2.91                          |
|                      | Emotions     | No operating room training programs | 3.03        | (0.972)     | 3.15         | (0.916)                      |
|                      | No continuity in work | 3.24        | (0.989)     | 3.28         | (0.912)     | 3.31                          |
|                      | No desire to work on difficult operations | 3.27        | (1.090)     | 3.39         | (1.006)     | 3.35                          |
|                      | Constant overtime | 3.06        | (1.061)     | 3.35         | (1.113)     | 3.29                          |
|                      | Always doing the same tasks | 2.87        | (1.073)     | 3.05         | (0.970)     | 3.12                          |
|                      | Using rest time to complete tasks | 3.11        | (1.093)     | 3.45         | (1.075)     | 3.44                          |
|                      | Always being criticized | 2.92        | (1.176)     | 3.16         | (1.159)     | 3.24                          |
|                      | Always busy  | 3.00        | (1.026)     | 3.37         | (1.049)     | 3.34                          |
|                      | Constant emergency surgeries, Not able to make sufficient preparation | 3.38        | (1.008)     | 3.50         | (0.997)     | 3.52                          |
|                      | Workload that clearly exceeds my capacity | 3.30        | (0.996)     | 3.55         | (0.980)     | 3.61                          |
|                      | Resentment toward coworkers | 3.32        | (1.086)     | 3.42         | (1.034)     | 3.27                          |
|                      | No clear communication with doctors | 3.72        | (0.960)     | 3.82         | (0.972)     | 3.69                          |
|                      | No coordination with other departments | 3.36        | (0.934)     | 3.39         | (0.965)     | 3.37                          |
|                      | Always considering job change | 2.58        | (1.120)     | 3.06         | (1.129)     | 3.19                          |
|                      | Always considering quitting | 2.50        | (1.220)     | 3.03         | (1.237)     | 3.23                          |
Table 5. One-way ANOVA of workplace environment of the 5 groups classified by cluster analysis

| Group | Group I | Group II | Group III | Group IV | Group V |
|-------|---------|----------|-----------|----------|---------|
|       | Very high satisfaction group | Somewhat high satisfaction group | Moderate satisfaction group | Somewhat low satisfaction group | Low satisfaction group |
|       | n=132  | n=195    | n=324     | n=408    | n=118   |
| Relationships of trust with others | 0.041 | 0.000    | 0.001 | 0.002 |
| Obtaining consultation/ cooperation | 0.000 | 0.000    | 0.000    | 0.000    |
| Study, training, and career progression | 0.005 | 0.010 | 0.038 | 0.003 |
| Job flexibility | 0.001 | 0.000 | 0.002 | 0.001 |
| Communication | 0.000 | 0.000 | 0.000 | 0.000 |
| Pride and goals regarding specialization/ the nursing profession | 0.000 | 0.000 | 0.000 | 0.000 |

n=1177
| Table 6. One-way ANOVA of experience of the 5 groups classified by cluster analysis |
|---------------------------------|----------------|----------------|----------------|----------------|----------------|
| Group I                          | Group II       | Group III      | Group IV       | Group V        | n=1177         |
| Low satisfaction group           |                |                |                |                |                |
| Very high satisfaction group     |                |                |                |                |                |
| n=132                           | n=195          | n=324          | n=408          | n=118          |
| Listened to                      |                |                |                |                |                |
| I                               | 0.000          | 0.000          | 0.000          | 0.000          |
| II                              | 0.004          | 0.000          | 0.000          |                |
| III                             | 0.000          | 0.004          |                | 0.000          |
| IV                              | 0.000          | 0.000          | 0.002          |                |
| V                                | 0.000          | 0.000          | 0.000          | 0.002          |
| Recognition from doctors        |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Recognition from superiors      |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Entrusted by superior            |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Rewarded for struggle            |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Useful                           |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Closely supervised when lacking confidence |            |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Given advice                     |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Protected from unfounded criticism |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
| Competing with colleagues        |                |                |                |                |                |
| I                               |                |                |                |                |                |
| II                              |                |                |                |                |                |
| III                             |                |                |                |                |                |
| IV                              |                |                |                |                |                |
| V                                |                |                |                |                |                |
Table 7. One-way ANOVA of emotion of the 5 groups classified by cluster analysis

| Group | Group I | Group II | Group III | Group IV | Group V |
|-------|---------|----------|-----------|----------|---------|
|       | n=1177  | n=1155   | n=324     | n=408    | n=118   |
|       | Very high satisfaction group | Somewhat high satisfaction group | Moderate satisfaction group | Somewhat low satisfaction group | Low satisfaction group |
| No operating room training programs | | | | | |
| I | 0.001 | 0.028 |
| II | 0.001 | 0.028 |
| III | 0.010 |
| IV | 0.014 | 0.014 | 0.010 |
| V | 0.048 |
| No continuity in work | | | | |
| I | 0.014 | 0.048 |
| II | 0.014 |
| III | 0.010 |
| IV | 0.014 | 0.014 | 0.010 |
| V | 0.048 |
| No desire to work on difficult operations | | | | |
| I | 0.048 |
| II | |
| III | |
| IV | 0.048 |
| V | |
| Constant overtime | | | | |
| I | 0.000 | 0.000 |
| II | 0.000 | 0.000 |
| III | 0.000 | 0.000 |
| IV | 0.000 | 0.000 |
| V | 0.000 | 0.000 |
| Always doing the same tasks | | | | |
| I | 0.000 | 0.000 |
| II | 0.000 | 0.000 |
| III | 0.000 | 0.000 |
| IV | 0.000 | 0.000 |
| V | 0.000 | 0.000 |
| Using rest time to complete tasks | | | | |
| I | 0.042 | 0.030 | 0.000 | 0.000 |
| II | 0.042 | 0.045 |
| III | 0.030 | 0.005 | 0.015 |
| IV | 0.042 | 0.005 | 0.015 |
| V | 0.045 | 0.015 |
| Always being criticized | | | | |
| I | 0.032 |
| II | 0.002 |
| III | |
| IV | 0.032 |
| V | 0.002 |
| Always busy | | | | |
| I | 0.013 |
| II | 0.003 |
| III | 0.012 |
| IV | 0.000 | 0.000 |
| V | 0.000 | 0.012 |
| Constant emergency surgeries, Not able to make sufficient preparation | | | | |
| I | | |
| II | |
| III | |
| IV | 0.022 |
| V | |
| Workload that clearly exceeds my capacity | | | | |
| I | 0.000 | 0.001 |
| II | 0.000 |
| III | 0.000 |
| IV | 0.042 |
| V | 0.001 |
| Resentment toward coworkers | | | | |
| I | | |
| II | |
| III | |
| IV | |
| V | |
| No clear communication with doctors | | | | |
| I | | |
| II | |
| III | |
| IV | |
| V | |
| No coordination with other departments | | | | |
| I | | |
| II | |
| III | |
| IV | |
| V | |
| Always considering job change | | | | |
| I | 0.002 |
| II | 0.020 |
| III | 0.020 |
| IV | 0.000 |
| V | 0.000 |
| Always considering quitting | | | | |
| I | 0.000 |
| II | 0.000 |
| III | 0.000 |
| IV | 0.014 |
| V | 0.046 |
job satisfaction)

This group had very low job satisfaction and was characterized by operating-room nursing experience of 5–10 years (40.7%) and significantly longer (p = 0.025). Workplace environment items were significantly low (p < 0.001). Items that led to decreased emotions showed significant dissatisfaction with nursing work, such as “always doing the same tasks (p < 0.001)” and “always busy (p < 0.001).” Therefore, Group V was described as “Dissatisfied operating-room veterans with the lowest job satisfaction.”

DISCUSSION

Job satisfaction was classified five groups after the survey below.

Group I (High job satisfaction and pride in being recognized) comprised nurses employed immediately after graduation, with a clear sense of purpose in learning about operating-room work. Because they did not have any prior employment experience, no factors caused dissatisfaction in interpersonal relationships, superiors' management ability, or work patterns. With regard to the workplace environment, their scores were significant and the highest among groups. Because they lacked confidence in their knowledge and skills, they required a stable workplace environment (19). This group greatly affected job satisfaction in operating-room work.

Group II (Somewhat high job satisfaction but the worst emotions toward doctors and coworkers) comprised nurses in young and middle-age ranges, both having 5 years or less of operating-room nursing experience. For all items on workplace environment and experience, they had high levels of satisfaction (second to Group I). In contrast to Group I, however, Group II gave the most responses of “No clear communication with doctors” and “Resentment toward coworkers,” indicating decreased job satisfaction because of difficulties communicating with doctors and feeling that they work harder than other nurses but without any results.

Group III (Moderate job satisfaction and adaptable to the workplace environment) had a wide range of ages and a greater number of years of nursing experience than years of operating-room nursing experience. Since they had experience of other posts, for both interpersonal relationships and operating-room work content while undergoing difficulties, they desired to take on and adapt to any workplace environment. As Ainaí (20) states, the pleasure of making the effort to adapt to a workplace leads to increased job motivation. With no clear satisfaction or dissatisfaction, this was a flexible group that could adapt to the environment while communicating with coworkers and doctors, despite changing positions, because they had a sense of fellowship and appreciation for others working in the same post.

Group IV (Dissatisfied veteran nurses with somewhat low job satisfaction) had the largest ratio of experienced nurses, with 11–20 years of nursing experience. They were assigned to the operating room, possibly because they could not properly adapt to changes in their career paths or in workplace environments and job details differing from previous ones (20, 21). For that reason, results were somewhat low for job satisfaction, workplace environments, experiences, and emotion.

Among the five groups, Group V (Dissatisfied operating-room veterans with the lowest job satisfaction) had the most nurses with 5–10 years of operating-room nursing experience. Motivation plateaus at 5–7 years, after which, in contrast to general-ward nurses who maintain their motivation (22), the motivation of operating-room nurses clearly drops off at 4–5 years (11). This might be why this group had the lowest results for workplace environment, experiences, and emotion. This might show why, in turn, there are no study, training, and career progression systems at work facilities, as identified in many prior studies (22-25). In such workplace environments, nurses are unable to find new goals despite having mastered surgical techniques.

Based on age and number of years' experience, clearly, there were differences among the five groups in the importance of the workplace environment, nursing experience, and nurses' emotions. In cluster analysis, support methods suited to each group were investigated according to each of the five groups' characteristics.

Group I comprised nurses assigned immediately after entering employment, and their experience of others' approval affected their job satisfaction, which increased as their acquisition of knowledge and skills in surgical techniques were rated and approved. Group II had difficulty building relationships with doctors while also resenting coworkers. This group requires individual training methods suited to their skill level and organizational management that builds favorable relationships with doctors. Group III had many years of nursing experience but few years of experience in the operating room; in the future, this group's job satisfaction must be raised, so they acquire operating-room nursing experience and so their motivation does not decrease. While Group IV had the highest ratio of overall experience, many have 5 years or less of operating-room experience. This might signify a high ratio of reassigned nurses, so leaders must consider their experience and respect their values and perspectives; leaders should adjust their workloads according to individual skill levels. Although having the most operating-room nursing experience, Group V also had low job satisfaction. This might signify that their knowledge and skills remained tacit.

By intentionally supporting and maintaining vocalization of tacit knowledge, as described by Nonaka (16), sharing it between organizations, and converting it to explicit knowledge, this group is expected to increase their practical capacity for nursing in operating-room organizations.

CONCLUSION

On the basis of job satisfaction, cluster analysis categorized operating-room nurses into five groups, characterizing each group and recommending appropriate support methods.

STUDY LIMITATIONS AND FUTURE CHALLENGE

This study categorized five operating-room nursing groups based on job satisfaction, workplace environment, experiences, and emotions. The study proposed support methods suited to each group's characteristics and proposed enhancements to operating-room nursing job satisfaction and to operating-room nursing itself, which can further contribute to work in the operating room. However, no report is made here on a practical level.

The future challenge is to create and implement an operating-room nursing training program that utilizes operating-room nurses' tacit mastery techniques and converts them to the systematic, explicit knowledge of the Group V that desires to be more active.

CONFLICT OF INTERESTS

There is no conflict of interest for both authors and co-authors.
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REFERENCES

1. Watanabe T, Shigehisa K, Kaiso R, Tokuyou Y: Relationship between Nurse’s stress and job specialty. (in Japanese) Journal of Japan Nursing Management 17(10): 871-876, 2007
2. Eida R, Mitanda Y, Yara C: Development of operation room nurse’s stress scale and evaluation of its reliability and validity. (in Japanese) Journal of Japan Operating Nurse Association 9(1): 39-41, 2013
3. Ejima Y, Shiga T: Actual state and problems of hybrid surgical unit in Tohoku University Hospital. One year after operation. (in Japanese) Journal of Japanese Association for Operative Medicine 36: 19-22, 2015
4. Shimizu J, Furuchi Y: Why we changed management of TAVI from general to local anesthesia. (in Japanese) Journal of system for clinical anesthesia. 39(4): 446-451, 2019
5. Fujimoto H, Sugawara S, Watanabe T, Hirai I, Kimura W: Usefulness of stapled anastomosis for gastrojejunostomy and Braun anastomosis for pancreaticoduodenectomy. (in Japanese) Yamagata Med J. 36(2): 92-97, 2018
6. Global Health Consulting Japan: http://www.gbc-j.com
7. Yasuda N, Nishimura Y, Nakanishi S, Mitsutake Y: Empirical study in the efficiency of operation room utilization - cost accounting by diseases and measurement of working rate of operation room. (in Japanese) Journal of Health Economics and Policy 10: 5-20, 2001
8. Yamano A, Morimoto N, Yuno K, Okuda K, Fujishima E, Miyake H, Takayama N, Tanaka M: Actual condition survey of operation nurse’s stresses: Using job stress scale(-JSS-R), multifaceted job stress scale. (in Japanese) Proceedings of The Japan Society of Nursing, Adult Nursing I 40: 155-156, 2009
9. Ozaki F: Factors of job satisfaction in nursing, to bring out job satisfaction. (in Japanese) Nursing (“Kango”) 55(13): 40-43, 2003
10. Yamasaki Y, Terahira C, Koyama A, Aoki R: Stress and satisfaction degree of operating room nurses. Compared to nurses working in other departments. (in Japanese) Bulletin of Nagano Prefectural Society of Nursing Research 33: 76-78, 2013
11. Fukazawa K: Relationship between the assignment to operating room and motivation in “A” prefecture. (in Japanese) Journal of Japanese Association for Operative Medicine 31(3): 208-212, 2010
12. Kiryu M, Sugawara M, Hasegawa M, Fujiwara Y: Satisfaction and influencing factors on nurses working on operating room in “A” hospital. Bulletin of Society of Hokkaido for the Study of Nursing 2018, pp.97-99
13. Tsujimoto H: A study of factors that operating room nurses feel worth of jobs. (in Japanese) Japanese Journal of Nursing Science 38(9): 61-65, 2013
14. Kitawaki T, Usui R, Yamamoto T, Kaneda Y: Factors related to the job continuation of relocated operation room nurses. (in Japanese) Journal of Japan Operative Nursing Academy 7(1): 27-30, 2011
15. Rhodes MJ, Gruendemann BJ, Ballinger WF: Alexander's care of the patient in surgery, Mosby Company, St. louis, 1978
16. Nanaka I: Creating organizational order out of chaos: self-renewal in Japanese firms, California Management 30(2): 57-73, 1988
17. Oogane H, Kimura M, Hamada K, Ishihara Y, Kikuchi K, Ishibashi M: Result and analysis of 5th investigation for member’s current status of Japan Operative Nursing Academy. (in Japanese) Journal of Japan Operative Nursing Academy 11(1): 68-94, 2010
18. Hasebe T: A study for the acquisition process of job satisfaction in operative nursing. (in Japanese) Journal of Japanese Operative Nurse Academy 7(1): 41-44, 2011
19. Kiyono T, Suzuki M, Tsujimura M, Sagara M, Takekura A, Saitou M, Kawamura A, Domon K, Honma M: An investigation of work motivation among operating room nurses. Contrast nurses, 3years or less working with those over 3years. (in Japanese) Journal of Japanese Operative Nurse Academy 8: 17-19, 2012
20. Ainae É: Experiences related to reality shock of nurses re-assigned to operating room. (in Japanese) Bulletin of Nursing Educational Study, Center of Practical Education, Kanagawa University of Human Services 34 : 109-116, 2009
21. Mizutani S, Ootaki S, Yamanaka M, Shiromaru M: Psychological change of nurses relocated to operating room from ward. (in Japanese) Proceedings of The Japan Society of Nursing, Adult Nursing 40: 69-70,2009
22. Ikebe M, Kitai A: Points of specific measures for operation room management and staff education. (in Japanese) Nurse Manager 9(11): 69-74, 2008
23. Kawamukai Y, Yoshiki S, Yanamaka M, Shiromaru M: Psychological change of nurses relocated to operating room from ward. (in Japanese) Journal of Japanese Association for Operative Medicine 29 : 286-288, 2008
24. Ikebe M: Points of specific measures for operation room management and staff education. (in Japanese) Nurse Manager 9(10): 59-64, 2008
25. Suzuki M: Education program of operative nursing. (in Japanese) Journal of Japan Operative Nursing Academy 5 : 32-34, 2009