

ORIGINAL ARTICLE

Effect of nurses' work environment on patient satisfaction: A cross-sectional study of four hospitals in Japan

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Abstract

Aim: The Magnet Recognition Program is a system in the USA that recognizes a hospital as a magnet hospital for having a high retention rate of nurses and providing high quality patient care. The purpose of this study was to examine the effect of nurses' work environment with characteristics that are similar to those of magnet hospitals on patient satisfaction in Japan.

Methods: The authors distributed anonymous self-administered questionnaires in August 2011 to all nurses via the directors of the nursing departments of four private hospitals. The response rates were 91% ($n = 425$) for nurses and 51% ($n = 379$) for patients. In the questionnaire for nurses, the items addressed basic attributes and a scale of work environment characteristics of a magnet hospital (the Japanese version of the Practice Environment Scale of the Nursing Work Index [PES-NWI]). The questionnaire for patients addressed basic attributes, information about their hospitalization, and items to assess patient satisfaction. To examine the effects of the PES-NWI subscales on patient satisfaction, the authors conducted multivariate logistic regression analysis for groups, which were dichotomized by 75 percentile of the scores of patient satisfaction.

Results: The result of model 1 in the multivariate logistic regression analysis demonstrated that collegial nurse–physician relations showed significant relationships with low patient satisfaction (odds ratio = 0.144, $P < 0.05$), while the significance was diminished in model 2, in which dummy variables of hospitals were entered into the equation.

Conclusion: These findings suggested that a favorable work environment for nurses, which is similar to that of magnet hospitals, may influence patient satisfaction in hospitals in Japan.

Key words: hospitals, nurses, patient satisfaction, work environment.

INTRODUCTION

In 1994, the American Nurses Credentialing Center launched the Magnet Recognition Program. This program recognizes magnet hospitals as institutions that have maintained a low turnover rate of nurses and that have provided high quality patient care (Floyd & Mulvey, 2010). The recognition of the magnet program

as a valuable designation has been expanding in both the USA and abroad (American Nurses Credentialing Center, 2012).

Researchers have empirically confirmed the advantages of magnet hospitals over non-magnet hospitals. Previous studies have compared the differences between magnet hospitals and non-magnet hospitals and have demonstrated the superiority of magnet hospitals based on nurse-related outcomes (e.g. job satisfaction of nurses, intention to leave, nurses' perceptions of care quality or safety) and patients (patient satisfaction) (Lacey *et al.*, 2007; Schmalenberg & Kramer, 2008; Ulrich, Buerhaus, Donelan, Norman, & Dittus, 2007). Additionally, previous studies have highlighted the

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significance of working environments in magnet hospitals. Such studies have revealed that the particular work environment of magnet hospitals has influenced nurses' job satisfaction/dissatisfaction (Kelly, McHugh, & Aiken, 2011; Lacey *et al.*, 2007; Schmalenberg & Kramer, 2008; Ulrich *et al.*, 2007), burnout (Kelly *et al.*, 2011), turnover (Ulrich *et al.*, 2007), and patient satisfaction of nursing care (Kutney-Lee *et al.*, 2009).

The magnet hospital recognition system has also attracted the attention of hospital administrators and researchers in Japan (Kuwahara, 2008; Ogata, Nagano, & Akanuma, 2008; Ogata, Nagano, Fukuda, & Hashimoto, 2011; Ogata *et al.*, 2010). Although no hospitals have yet applied for the magnet designation in Japan, three studies (Ogata *et al.*, 2010; Ogata *et al.*, 2011; Tei-Tominaga, Tsuchiya, & Sato, 2012) have examined the effect of work environments with similar characteristics to the work environment in the magnet hospitals on nurses' job satisfaction and intention to stay using the Japanese version of the Practice Environment Scale of the Nursing Work Index (PES-NWI) developed by Lake (Lake, 2002). These findings have revealed the significance of the work environment on nurses' job satisfaction and job retention.

If the work environment of a Japanese hospital has the same characteristics as a magnet hospital, it can be expected to have an effect not only on nurses but also on patients. Previous studies have reported that while the nurses' working environment was significantly related to patient satisfaction (Kutney-Lee *et al.*, 2009), patient satisfaction with patient care in magnet and magnet-in-progress hospitals was significantly higher than that in non-magnet hospitals (Smith, 2014). However, a work environment similar to that of magnet hospitals may have a dissimilar effect on patients in hospitals in Japan because of the various differences (e.g. a health-care system, culture) between Japan and the USA. A previous case study (Tominaga, Sato, & Michiwaki, 2012), which examined the differences and similarities of cross-cultural leadership and nursing management styles between magnet hospitals in the USA and a Japanese non-magnet hospital with a similar low turnover ratio of nurses, highlighted the differences between the two countries.

The effect of work environment on patient care as it is perceived by nurses in Japanese hospitals with a working environment similar to that of magnet hospitals in the USA may be different. However, in Japan, no studies have examined the effect of a work environment similar to that of magnet hospitals on patient satisfaction. To help hospital directors and nursing managers understand the importance of work environment for

both nurses and patients, further studies examining the effect of the work environment of nurses on patients are necessary. The purpose of this study is, therefore, to examine the effect of a work environment for nurses that is similar to that of a magnet hospital on patient satisfaction in Japan.

METHODS

Study design

A cross-sectional design was used.

Setting and sample

The authors used a convenient sampling method. Four private hospitals in a selected prefecture in Japan agreed to cooperate with the survey after a researcher's explanation and returned consent forms signed by the hospitals' directors. Three of the hospitals were general hospitals and one was a hospital for mainly long-term nursing care and medical treatment. Turnover of nurses at the four hospitals ranged 7.8–20%. The number of beds in these four hospitals ranged 50–350 (Table 1).

The sample size was predetermined by using a power analysis based on the power of 0.90 ($\beta = 0.10$), $\alpha = 0.05$, and an effect size of 0.20 ($r = 0.2$), and it was determined that 319 participants were appropriate for analysis (Browner, Cummings, Grady, Hulley, & Newman, 2009) in this study.

Ethical considerations

Approval for this study was obtained from the institutional ethics committee at the institute of the principal researcher (#10028) in 2011. No participants (nurses, patients) in this survey were required to sign consent forms as the return of the questionnaire constituted implied consent. Participants were informed about the voluntary nature of participation and assured of confidentiality in the handling of data.

Data collection

In August 2011, the authors distributed a questionnaire to all nurses ($n = 469$) and hospital inpatients ($n = 742$) in all wards ($n = 21$) of the four hospitals. The person in charge of the nursing department in each hospital provided information about the study to potential participants. If nurses and patients agreed to participate, they completed and returned their questionnaire to the researcher in a sealed envelope via the nursing department within 1–4 weeks of distribution. No reminder was sent to the participants after the first notice of the

Table 1 Basic attributes and characteristics of nurse ($n = 363$) and patients ($n = 343$), and characteristics of organizations ($n = 4$)

Variables	N	%
Nurses		
Age, years	Mean	34.20 ± 8.88
Sex		
Female	349	96
Male	14	4
Marital status		
Single	130	36
Married	233	64
Education		
Junior college/vocational school equivalency degree	342	94
College graduate or higher	21	6
Organization		
Hospital A	154	42
Hospital B	130	36
Hospital C	74	20
Hospital D	5	1
Working tenure		4.39 ± 5.21
Patients		
Age, years	Mean	59.88 ± 17.91
Duration of hospitalization (days)	Mean	23.21 ± 59.27
Sex		
Female	174	51
Male	169	49
Hospital		
Hospital A	168	49
Hospital B	79	23
Hospital C	85	25
Hospital D	11	3
Operative treatment		
Received	185	54
None	158	46
No. of hospitalizations at this hospital		
One time	187	55
Two times	49	14
Three times	32	9
Four times	20	6
Five times or more	55	16
Duration of hospitalization		
1–7 days	150	44
8–14 days	87	25
15–21 days	31	9
22–28 days	18	5
29–35 days	15	4
≥ 36 days	42	13
Organizations		
Hospital size (no. of beds)		
Hospital A	349	–
Hospital B	279	–
Hospital C	154	–
Hospital D	72	–
Turnover ratio of nurses		
Hospital A	–	14.2
Hospital B	–	9.0
Hospital C	–	7.8
Hospital D	–	20.0

study. Four hundred and twenty-five nurses (91%) and 379 patients (51%) returned their questionnaires of four hospitals. After deleting missing data, the authors used each set of completed data of nurses ($n = 363$) and patients ($n = 343$) in 19 wards from the four hospitals for analysis. The authors matched the nursing data – the mean scores of the five subscales of the PES-NWI – to the patients' data on the basis of their wards ($n = 19$) for final analysis. The average age of nurses was 34.20 years (standard deviation [SD] = 8.88) and that of patients was 59.88 years (SD = 17.91).

Measures

Two different types of questionnaires were prepared for nurses and patients in this study. In the questionnaire for nurses, basic attributes (sex, age, marital status, educational level, and working tenure) were addressed, and the Japanese version of the PES-NWI, which is a scale for assessing characteristics of the work environment in a magnet hospital, was also included. In the questionnaire for patients, questions addressed basic attributes (sex, age), and information about their hospitalization (number of hospitalizations at this hospital, duration of hospitalization, having operative treatment), and five questions assessed patient satisfaction.

Japanese version of the PES-NWI

To assess the work environment of magnet hospitals, the authors used the 31 items of the PES-NWI (Ogata *et al.*, 2008) developed by Lake (Lake, 2002). The Japanese version of the PES-NWI was developed by a translation and back-translation procedure, and consists of five subscales: (i) nurse participation in hospital affairs (nine items; e.g. “Staff nurses are involved in the internal governance of the hospital”); (ii) nursing foundations for quality of care (10 items; e.g. “Use of nursing diagnoses”); (iii) nursing manager ability, leadership, and support of nurses (five items; e.g. “A head nurse who is a good manager and leader”); (iv) staffing and resource adequacy (four items; e.g. “Enough staff to get the work done”); and (v) collegial nurse–physician relations (three items; e.g. “There is a lot of teamwork between nurses and doctors”) (Lake, 2002; Ogata *et al.*, 2008). The PES-NWI has demonstrated internal consistency and content validity with high reliability for nurses (Lake, 2002), including Japanese nurses (Ogata *et al.*, 2010; Ogata *et al.*, 2011). The questions had four response options – “totally disagree”, “disagree”, “agree”, and “totally agree” – with each item scored using a Likert scale (1–4). The average scores of five subscales were calculated and used in this study. Higher total scores

indicated a higher degree of similarity to the work environment in magnet hospitals, implying a desirable practice environment.

Patient satisfaction

Patient satisfaction with nursing care has been found to be one of the most important predictors of satisfaction with hospital care. Additionally, previous surveys reported that one of the important patient outcomes is that patients definitely recommend the hospital to others (e.g. friends or family members) (Drachman, 1996; U.S. Department of Health and Human Services, 2012). Based on the findings of previous studies (Jha, Orav, Zheng, & Epstein, 2008; Kutney-Lee *et al.*, 2009) as well as the opinions of nursing managers, the present authors developed five original questionnaire items for assessing patient satisfaction: (i) “I was satisfied with the nurses' explanation”; (ii) “I was satisfied with the nursing care during my hospitalization”; (iii) “I was satisfied with the nurses' work ethic”; (iv) “I think I will recommend this hospital to my friends and family members”; and (v) “I was satisfied with this hospital overall”. Each question was evaluated using a 5 point Likert scale ranging from 1 (“I totally disagree”) to 5 (“I agree very much”). The authors confirmed a single factor which showed high internal consistency ($\alpha = 0.91$) with the results of the factor analysis. The summed five items were used for analysis as a patient satisfaction variable. A higher total score indicates greater satisfaction among patients.

Analysis

The authors identified the basic attributes and characteristics of participants (nurses and patients) and organizations as well as items of patient satisfaction. Next, the authors used descriptive statistics and calculated the Cronbach's alphas of the subscales of the PES-NWI of nurses and the patient satisfaction variable.

In terms of final analysis, if a hospital's work environment shows the characteristics of a magnet hospital, the characteristics of the work environment of each ward should be observed. Researchers have indicated that multilevel techniques need to be applied to the analysis of data that represent patients embedded in units and units embedded in hospitals (Dunton, Gajewski, Klaus, & Pierson, 2007). Thus, analysis using a multilevel modeling was preferable for final analysis in this study. However, the data from this study (e.g. a dataset consisting of 19 wards which contain 2–37 individual datasets, respectively) did not meet the requirements for analysis using multilevel modeling in terms of

Table 2 Descriptive statistics of question items of the patient satisfaction ($n = 343$)

Question items [†]	Range	Mean	SD
1. I was satisfied with the nurses' explanations	2–5	4.42	0.63
2. I was satisfied with the nursing care during my hospitalization	2–5	4.48	0.61
3. I was satisfied with the nurses' work ethic	2–5	4.49	0.62
4. I think I will introduce this hospital to my friends and family members	2–5	4.35	0.72
5. I was satisfied with this hospital overall	1–5	4.18	0.68

[†]Each question item was evaluated using a 5 point Likert scale ranging from 1 (“I totally disagree”) to 5 (“I agree very much”). A higher score indicates greater satisfaction. SD, standard deviation.

maintaining enough power (e.g. a dataset consisting of 30 group data needs to have more than 30 individual datasets) (Ita Kreft & Jan de Leeuw, 1998/2006). Additionally, the distribution of patient satisfaction score was not normally distributed (coefficient of skewness, -0.848 ; Shapiro–Wilk test, $P < 0.001$). Thus, to examine effects of the PES-NWI subscales on patient satisfaction, the authors conducted multivariate logistic regression analysis for groups, which were dichotomized by 75 percentile of the scores of patient satisfaction.

As a preliminary step in the final analysis, the authors calculated Spearman's correlation coefficients between dependent variables and the PES-NWI subscales and characteristics of patients. Next, the authors allocated “0” to the patient group in which satisfaction score was in the upper 75 percentile (≥ 20) as satisfaction group ($n = 299$), and “1” to the other patient group in which satisfaction score was not in the upper 75 percentile (< 20) as the low satisfaction group ($n = 44$). Then, the authors conducted multivariate logistic regression analysis for the low patient satisfaction group using a maximum likelihood method, in consideration of the correlation level which may have the possibility of significant relationship with the dependent variable ($P < 0.25$) (Tsushima, 2010). All subscales of the PES-NWI except for “nurse manager ability, leadership, and support of nurses” were entered into the equation, along with variables of basic attributes and characteristics (sex, age, duration of hospitalization, and operative treatment) in model 1. Next, in order to examine the effect of organization, dummy variables of hospitals were entered into the equation in model 2. The authors performed statistical analyses with SPSS version 15.0 (IBM, Tokyo, Japan). A P -value of less than 0.05 was regarded as indicating statistical significance.

RESULTS

Table 1 shows a summary of the basic attributes, such as employment and organizational characteristics of the

participants. In terms of nurses, 96% of participants were female, 64% were married, and 94% had a junior college degree or an equivalent vocational degree in nursing. Regarding patients ($n = 343$), 51% were female and 54% had operative treatment. Fifty-five percent were patients who were hospitalized at the hospital for the first time, and the average duration of hospitalization was 23.21 days ($SD = 59.27$).

All mean scores of the patient satisfaction items were over 4.0 and SD ranged 0.61–0.72 (see Table 2). Although it is not specified in the table, it should be noted that more than 90% of participants answered “agree/totally agree” to all question items of patient satisfaction except for one item (“I think I will introduce this hospital to my friends and family members”). The results of alpha coefficients on the subscales of the PES-NWI in nurses ranged 0.78–0.86; on the variable of patient satisfaction it was 0.91 (see Table 3). For the results of Spearman's correlation coefficients, patient satisfaction correlated significantly with a subscale on the PES-NWI: nursing foundations for quality of care ($r = 0.12$, $P < 0.05$) as perceived by nurses. Additionally, patient satisfaction correlated significantly with organizations: hospital A ($r = -0.13$, $P < 0.05$) and hospital C ($r = 0.20$, $P < 0.001$) (see Table 4). Although it is not shown in the table, the highest correlation coefficient between independent variables was that of staffing and resource adequacy, one of the subscales of PES-NWI, and hospital A ($r = -0.70$, $P < 0.001$).

The results of the multiple logistic regression analysis (see Table 5) showed that low patient satisfaction was significantly related to collegial nurse–physician relations, a subscale of the PES-NWI (odds ratio [OR] = 0.144, $P < 0.05$) in model 1. However, in model 2 in which dummy variables of hospitals were entered into the equation, the significance of collegial nurse–physician relations was diminished (OR = 0.200, $P < 0.10$) and hospital C showed significance (OR = 0.339, $P < 0.05$). The scores of the Hosmer–Lemeshow goodness of fit were of a satisfactory level in

Table 3 Descriptive statistics and Cronbach's alphas of subscales of the PES-NWI and patient satisfaction

Variables	N	Mean	SD	Items	Range	α
The Japanese version of the PES-NWI [†]						
Nurse participation in hospital affairs	363	2.49	0.41	9	1–4	0.78
Nursing foundations for quality of care	363	2.54	0.41	10	1–4	0.83
Nurse manager ability, leadership, and support of nurses	363	2.67	0.57	5	1–4	0.86
Staffing and resource adequacy	363	2.39	0.60	4	1–4	0.80
Collegial nurse–physician relations	363	2.45	0.53	3	1–4	0.81
Patient satisfaction [‡]	343	21.93	2.77	5	10–25	0.91

[†]Each question item was evaluated by nurses. Higher total scores indicated more characteristics of the work environment of magnet hospitals, indicating a desirable practice environment. [‡]The variable of patient satisfaction is the sum of five question items which were evaluated by patients. A higher score indicates greater satisfaction among patients. SD, standard deviation.

Table 4 Spearman correlation coefficients between dependent variables and the PES-NWI subscales and characteristics of patients ($n = 343$)

	Patient satisfaction	P
1. Nurse participation in hospital affairs [†]	0.04	0.450
2. Nursing foundations for quality of care [†]	0.12	0.031
3. Nurse manager ability, leadership, and support of nurses [†]	0.04	0.447
4. Staffing and resource adequacy [†]	0.09	0.088
5. Collegial nurse–physician relations [†]	0.10	0.076
6. Sex	0.05	0.343
7. Age	−0.07	0.224
8. Operative treatment	−0.05	0.361
9. Duration of hospitalization	−0.06	0.296
10. No. of hospitalizations at this hospital	−0.04	0.440
11. Hospital A (0 = no, 1 = yes)	−0.13	0.016
12. Hospital B (0 = no, 1 = yes)	−0.03	0.567
13. Hospital C (0 = no, 1 = yes)	0.20	<0.001
14. Hospital D (0 = no, 1 = yes)	−0.05	0.362

[†]The Japanese version of the Practice Environment Scale of the Nursing Work Index (PES-NWI).

both model 1 ($\chi^2 = 4.950$, d.f. = 8, $P = 0.762$) and model 2 ($\chi^2 = 3.747$, d.f. = 8, $P = 0.879$). The discriminant predictive values were 87.5% and 87.2%, respectively.

DISCUSSION

The present authors have found that hospitals in Japan with a work environment that nurses perceive to be similar to the work environment in magnet hospitals are associated with patient satisfaction. This study supports previous findings (Kutney-Lee *et al.*, 2009; Smith, 2014) and provides meaningful new insights into the importance of nurses' work environment for patient satisfaction in Japan. Kutney-Lee *et al.* (2009) examined the relationship between nurses' work environment and patient satisfaction across 430 hospitals in the USA and showed that the quality of the nurses' work environment

was associated with patient satisfaction. Another study, using a secondary analysis of Smith (2014), indicates that magnet and magnet-in-progress hospitals have significantly higher scores than non-magnet hospitals on six out of the seven questions regarding patient-reported satisfaction of care.

Furthermore, the present authors' finding of collegial nurse–physician relations, which showed a significant relationship with low patient satisfaction in the multivariate logistic regression analysis in model 1 (OR = 0.144, $P < 0.05$), underlines the importance of relationships between doctors and nurses for patient satisfaction. This finding also suggests previous research in which patients were found to be more satisfied with their care in facilities which have good human relationships, such as strong teamwork culture (Meterko, Mohr, & Young, 2004) and good relationships between

Table 5 Multivariate logistic regression model for the low patient satisfaction ($n = 343$)

	Model 1 [†]			Model 2 [‡]		
	OR	95% CI	P	OR	95% CI	P
Basic attributes and characteristics						
Duration of hospitalization	1.003	0.999–1.007	0.129	1.003	0.999–1.007	0.180
Operative treatment	0.653	0.326–1.310	0.231	0.648	0.321–1.310	0.227
Subscales of the PES-NWI						
Collegial nurse–physician relations	0.144	0.023–0.904	0.039	0.200	0.031–1.281	0.089
Organization						
Hospital C (0 = no, 1 = yes)				0.339	0.116–0.996	0.049

[†]Patient satisfaction was dichotomized by 75 percentile of the scores. Low patient satisfaction means that the patient satisfaction score was not in the upper 75 percentile. In model 1, independent variables (four subscales of the PES-NWI) were entered into the equation along with variables of basic attributes and characteristics (sex, age, duration of hospitalization, and operative treatment), using a maximum likelihood method. [‡]In model 2, dummy variables of hospitals were entered in the equation of model 1. Hosmer–Lemeshow goodness of fit: $\chi^2 = 4.951$, d.f. = 8, $P = 0.763$ for model 1, and $\chi^2 = 3.747$, d.f. = 8, $P = 0.879$ for model 2. CI, confidence interval; OR, odds ratio; PES-NWI, Practice Environment Scale of the Nursing Work Index.

doctors and nurses (Vahey, Aiken, Sloane, Clarke, & Vargas, 2004). Moreover, Vahey *et al.* (2004) showed that patients who were cared for in units that nurses characterized as having adequate staff, good relations between nurses and physicians, and good administrative support for nursing care were more than twice as likely as other patients to report high satisfaction with their care. They mentioned that the key role of nurses in patient satisfaction may be more relational than technical.

However, the significance of collegial nurse–physician relations was diminished in model 2 when dummy variables of hospitals entered into the equation of model 1 in the multivariate logistic regression analysis. This suggested that there might be an effect of characteristics of organization, such as hospital C which has a low turnover ratio of nurses (7.8%), on patient satisfaction. As researchers have indicated that multilevel techniques need to be applied to the analysis of data that represent patients embedded in units and units embedded in hospitals (Dunton, Gajewski, Klaus, & Pierson, 2007), further studies using a multilevel analysis are desirable in the future.

In the present findings, two subscales of the PES-NWI, nursing foundations for quality of care and collegial nurse–physician relations, showed weak correlations with patient satisfaction score. However, the subscale of nursing foundations for quality of care did not show significance in the multivariate logistic regression analysis. Regarding patient satisfaction, previous studies on the relationship between patients' experiences (e.g. patient satisfaction) and the quality of clinical care have had mixed results.

A previous study that indicated a positive relationship between patients' experiences (e.g. high level of satisfaction) and the quality of clinical care in US hospitals (Jha *et al.*, 2008). However, another previous study, which examined the relationship between patient satisfaction and nurses' work environment using the PES-NWI, showed that the PES-NWI score was not significantly related to patient satisfaction scores (Gardner, Thomas-Hawkins, Fogg, & Latham, 2007). Others have also failed to find a relationship between patients' experiences and the quality of clinical care (Chang *et al.*, 2006; Rao, Clarke, Sanderson, & Hammersley, 2006).

Furthermore, while the significance of nurses' work environment has been shown above, one of the subscales on the PES-NWI (staffing and resource adequacy) was not found to be significant for patient satisfaction in this study. In previous studies, however, nurse staffing has affected patient satisfaction as well as the nurses' work environment (Kutney-Lee *et al.*, 2009; Meterko *et al.*, 2004; Vahey *et al.*, 2004). This discrepancy might have been influenced by the medical system in Japan, which enforces the Medical Service Act regulation. Every hospital in Japan – including the hospitals in this study – have patient-to-nurse ratios (e.g. seven patients to one nurse) that are enforced by the law (Ministry of Health, 1948).

In addition to the organizational characteristics examined in this study, such as hospital C which showed a low turnover ratio of nurses, the present authors' findings may be influenced by unmeasured confounding factors, such as other organizational characteristics (e.g. profit hospitals *vs* non-profit hospitals, teaching hospitals *vs* non-teaching hospitals) (Jha *et al.*, 2008). Cultural dif-

ferences in patients' perceptions and patients' disease status may also influence patient satisfaction. Brédart *et al.* (2003) found significant differences between country samples with regard to the proportion of patients wanting care improvement for the same level of satisfaction. Basic attributes (e.g. age and education level) had a similar effect across country samples. Butow, Maclean, Dunn, Tattersall, and Boyer (1997) also indicated that cancer patients' preferences for information and involvement differed if their disease status worsened. Considering the influence of these factors, further research which examines the effect of nurses' work environments in Japan that are similar to those in magnet hospitals on patient satisfaction would be required.

The present study has some limitations that should be discussed. First, the participants were nurses and patients in four private general hospitals, making the results possibly unique to the participants in this study. Additionally, the number of wards and individual data of each ward was relatively small for multilevel analysis. A study using a larger sample and multilevel analysis is needed in the future. Second, as this study used a cross-sectional design, longitudinal surveys are needed to determine the causal relationships among characteristics of the work environment perceived by nurses and patient satisfaction. Third, the reliability and validity of the Japanese version of the PES-NWI and patient satisfaction variable should be validated in future studies.

Although this study has some limitations, there is no previous study which examines the effect of nurses' work environments with the same characteristics as the work environment in magnet hospitals on patient satisfaction in Japan. The present authors' findings have provided meaningful new insights for hospital employers and nurse managers and will help them recognize the importance of work environment for both workers and customers in the health service industry in Japan. Additionally, this study lays the foundation for a larger study examining the effect of nurses' work environment on patient satisfaction in Japan with sufficient power for multilevel modeling.

CONCLUSIONS

This study examined the effect of nurses' work environment with characteristics that are similar to that of magnet hospitals on patient satisfaction in four hospitals in Japan. In the results of model 1 in the multivariate logistic regression analysis, one subscale of the PEW-NWS, collegial nurse–physician relations, showed a significant relationship with low patient satisfaction

(OR = 0.144, $P < 0.05$), while the significance was diminished in model 2, in which dummy variables of hospitals were entered into the equation. These findings suggested that a favorable work environment for nurses, in work environments that are similar to that of magnet hospitals, may influence patient satisfaction in hospitals in Japan.

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DISCLOSURE

The authors have no conflicts of interest.

AUTHOR CONTRIBUTIONS

M. T. conducted the whole study: designed this study, performed the statistical analysis, drafted the manuscript, and finished the final manuscript. F. S. contributed to the design of this study, critically reviewed the manuscript, and supervised the study process.

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