Investigation of the key determinants of Asian nurses' quality of life

Sachiko MAKABE[1]*, Yanika KOWITLAWAKUL[2], Mohd Said NURUMAL[3], Junko TAKAGAI[1], Orn-Anong WICHAIKHUM[4], Neyzang WANGMO[5], Suk Foon YAP[6], Wipada KUNAVIKTIKUL[4], Junko KOMATSU[7], Hideko SHIRAKAWA[7], Yutaka KIMURA[8] and Yoshihiro ASANUMA[9]

[1]Department of Clinical Nursing, Akita University Graduate School of Health Sciences, Japan

[2]Alice Lee Centre for Nursing Studies, National University of Singapore, Singapore

[3]Department of Nursing, International Islamic University Malaysia, Malaysia

[4]Department of Nursing, Chiang Mai University, Thailand

[5]Medical Education Center for Research Innovation and Training, Khesar Gyalpo University of Medical Sciences of Bhutan, Bhutan

[6]Department of Nursing, Khoo Teck Puat Hospital, Singapore

[7]Nursing Division, Akita University Hospital, Japan

[8]Department of Managementt Science and Engineering, Akita Prefectural University, Japan

[9]Akita University, Japan

Abstract: The study aimed to compare nurses' quality of life and investigate key determinants among Asian countries with different economic status. A cross-sectional survey was conducted across five Asian countries (Japan, Singapore, Malaysia, Thailand, and Bhutan). Quality of life (WHOQOL-BREF), job stress (National Institute of Occupational Safety and Health questionnaire), and demographic data were assessed. Stepwise multivariate linear regression analysis was performed to identify the key determinants of quality of life. Participants were 3,829 nurses (response rate: 82%) with a mean age of 33 ± 10 yr and majority were women (92%). Regarding quality of life, Bhutan yielded the highest scores, followed by Malaysia, Thailand, Singapore, and Japan, and these results were statistically significant. The key determinants that were significantly related to quality of life were "stress coping ability," "life satisfaction," "Japan," "social support," "job stress," and "Singapore" (adjusted R^2=0.46). In conclusion, nurses' quality of life differs across Asian countries and is not linked to the country's economic development. To maintain a good quality of life for nurses, an international exchange program like international nursing conferences for work environment and staff coping strategies is recommended to broaden institution' minds and share experiences and exchange views to be able to realize their own problems and discover global solutions to them.

Key words: Asian nurses, Quality of life, Occupational health, Stress at work, Hospital

---

*To whom correspondence should be addressed.
E-mail: 1smakabe@gipc.akita-u.ac.jp

Introduction

Improvement of the quality of nurses' lives is important to ensure they are providing the highest-quality care[1, 2]. Poor quality of life negatively affects nurses' health[3, 4] and causes high turnover rates[5–9]. Especially, hospital-based nurses are under high stress at work due to high workloads[10], high cognitive demand[11], and shift work[12]. Nurse staffing poorly affects patient outcomes[13]. High stress among hospital-based nurses is due to great responsibility requiring high levels of expertise and relatively low reward associated with the nursing profession[14]. If nurses are highly stressed, they are not able to provide safe and high-quality care. Factors involving quality of life include poor working conditions (high workload and job demands in addition to low job control)[10, 15–19], low job satisfaction[20], low social support[2], and individual coping ability[21, 22]. Similar factors are observed to affect nurses' quality of life, even across different countries. However, earlier studies have been conducted in individual countries rather than on a global scale.

A cross-sectional questionnaire survey to compare quality of life of hospital-based nurses in Japan, Thailand, South Korea, and the USA (Hawaii) was reported by Lambert and colleagues[23]. The average physical and psychological status of nurses across the different countries was equivalent, except for the lowest psychological status, which was found in Thailand. Although cross-cultural characteristics of nurses may vary, several factors were found to be identical (workload, number of people in the household, and likelihood of leaving the current nursing position),

Comparison of general (not only hospital-based) nurses' quality of life in Australia and New Zealand was also reported by Chang and colleagues[24]. More frequent workplace stress predicted lower physical and mental health. However, their quality of life was comparable. International research that could potentially guide differences in nurses' quality of life has been scarce. More countries need to be examined to gain a more international view of nurses' quality of life; however, multinational collaborative research is challenging,

A universal shortage of nurses has led to global competition in the hiring of nurses as well as migration of nurses from developing to developed countries. The migration and globalization of the nursing workforce are the latest concerns. To temporarily lessen the nursing shortage experienced in developed countries, nurses are being employed from other countries[25]. To improve quality of life, nurses travel from their home countries to more developed coun-

tries. However, global comparison of nurses' quality of life has been limited. Whether nurses' quality of life is better in developed countries compared to developing countries needs to be clarified.

This study was designed to compare nurses' quality of life across Asian countries including those with different economic status. This study contributes new scientific knowledge about differences in and determinants of quality of life for hospital-based nurses in Asia as well as guidance for institutions to improve quality of life.

Aims and objectives

Nurses' quality of life in Japan, Thailand, Malaysia, Bhutan, and Singapore was examined. The specific objective of this study was to compare nurses' quality of life, and key determinants were identified among Asian countries with different economic status.

Subjects and Methods

During the 16th East Asian Forum of Nursing Scholars International Conference in 2013, the study idea was formed. At this conference, the focal researcher (Japan) and co-researchers from Singapore and Malaysia decided to evaluate nurses' quality of life among various Asian countries. Co-researchers from Thailand and Bhutan joined the team later. Through correspondence from these five countries, a protocol was developed[26]. As indexes for country economic state, Gross National Income (GNI) and Gross Domestic Product (GDP)[27, 28] varied among these five countries. GNI ranking was as follows: Singapore (No. 15), Japan (No. 32), Malaysia (No. 81), Thailand (No. 109), and Bhutan (No. 152) out of 213 counties. GDP ranking was as follows: Singapore (No. 13), Japan (No. 32), Malaysia (No. 82), Thailand (No. 107), and Bhutan (No. 151) out of 213 countries.

Study framework

The National Institute of Occupational Safety and Health's (NIOSH) industrial health model was used as the framework[29]. This model indicates that job stress affects physical and psychological health. Differences in perceptions of and reactions to job stress are also led by individual factors, non-work factors, and social levels.

Study setting and participants

A cross-sectional questionnaire survey was conducted during the 2013–14 yr at 10 teaching hospitals in five Asian countries (Japan, Singapore, Malaysia, Thailand,

and Bhutan). Singapore, Malaysia, and Bhutan each had only one hospital whereas Japan had three and Thailand had four hospitals. For inclusion criteria, teaching hospitals were selected due to the standardized hospital level. These five countries were also representative of variations in Asia with respect to organization and nurses' training. All nurses working at hospitals as well as managers were included in the study sample, because general observation of quality of life and determinations were essential for this study. Nurses who had few working hours such as those working part time were also included in this study, although this situation could have influenced the results. Based on the central limit theorem definition[30], the target sample size of more than 500 participants was large enough to analyze and generalize the result except in Bhutan. Bhutan is small country with a population of less than one million. There are very few hospitals. Additionally, the numbers of nurses and rankings[31] was as follows: Japan (n=1,452,635, No. 4), Thailand (n=138,710, No. 23), Malaysia (n=90,199, No. 33), Singapore (n=29,340, No. 60), and Bhutan (n=736, No. 133). The numbers of nurses per 1000 of the population rankings[32] were as follows: Japan (n=11, No. 11), Singapore (n=6, No. 39), Malaysia (n=3, No. 74), Thailand (n=2, No. 85), and Bhutan (n=1, No. 109). Therefore, the sample size was set at more than 100 participants in Bhutan.

Variables

Quality of life was measured with the WHOQOL-BREF for the dependent variable. The World Health Organization developed this 26-item scale in five domains (physical, psychological, social relationships, environment, and overall)[33]. This quality of life scale is used worldwide and has been tested to confirm both its reliability and validity[33]. The total score ranges from 26 to 130. Higher scores indicate better quality of life.

Job stress, life satisfaction, individual factors, and non-work factors were measured for the independent variables. Job stress was measured using the NIOSH questionnaire and includes examinations of such things as workload (7 items), job control (16 items), job requirement (4 items), and mental demand (5 items). Job stress scores range from 32 to 151 with higher scores indicating higher job stress. Job satisfaction was also measured using the NIOSH. This job stress scale is broadly used and has been confirmed for reliability and validity[34]. Private life satisfaction was measured[35]. To achieve a life satisfaction score, job and private life satisfaction scores were combined with scores ranging from 5 to 17 and higher scores indicated greater life satisfaction.

Demographic data included age, sex, marital status, educational level, years of nursing experience, job title, unit type, shift type, working hours, annual leave acquisition rate, and stress coping ability. Originally, Antonovsky (1987) developed the stress coping ability scale. It has been translated into many languages and has been fully evaluated[36]. Higher scores indicate greater stress-coping ability. This scale has 13 items, which are scored from 13 to 91.

Non-work factors consisted of household duty, childcare, care of older adults/persons with disabilities, currently going to school, and voluntary/religious duties. Social support was measured by 12 items in three domains (immediate supervisor/boss, co-workers, and family/friends) by the NIOSH. Total scores range from 12 to 48 with higher scores indicating greater social support[34].

Data collection

Co-researchers often communicated with each other through e-mail and the tele-internet system to share updates of the data collection process. In Japan, Singapore, and Malaysia, the researchers made thorough agreements with the nursing directors concerning the data collection processes. Then, the data were systematically collected by the nursing director of each hospital. In Thailand, data were collected through an existing research network. This research network was well constructed for data collection. The hospital in Bhutan was compact; therefore, the co-researcher handed out the questionnaires to each department and collected the data directly from the departments.

Statistical analyses

Characteristics were compared using an analysis of variance (ANOVA) for numeric data and a χ^2 test for proportion to explain the different backgrounds of each country.

Quality of life was compared among the five counties using an analysis of covariance (ANCOVA). Controlling for baseline data, covariates (age, stress coping ability, social support level, job stress, and life satisfaction) were selected for the ANCOVA. Then, as a post-hoc test, the Tukey-Kramer method was used to examine differences among the country pairs.

To detect the determinations of quality of life, first Pearson's correlation coefficients were calculated between the independent variables (individual factors, non-work factors, social support levels, and job stress) and the dependent variable of quality of life for each country. Then, the independent variables were selected for the stepwise multivariate linear regression analysis if more than three countries had coefficients >0.2 (the absolute value). Furthermore, using

quantification method type 1[37]), each country was transposed into a numeric value. For example, if the data were Japanese, they were renamed "1," and the data from all other countries were set to "0." These country variables were selected as independent variables for the stepwise multivariate linear regression analysis, because the dynamic effect of each country was critical for our study. A p-value<0.1 was used as the cutoff point to retain in the model.

The JMP 10 Software (SAS Institute) was used to perform the statistical tests. The significance level was set at $p<0.05$.

Ethical considerations

The lead university in Japan (registration number 1094) ethically approved the study protocol first. Then, each organization in the four participating countries received ethical approval at the national level (Singapore: 2013/01197-AMD0001, Malaysia: 1031.54, Thailand: EXP-017-2557, Bhutan: REBH/Approval/2013/022). This study was registered as a clinical trial at UMIN, the university hospital medical information network in Japan (registration number UMIN000024300).

Participants received a letter reporting the study aims and methods, which included the following: 1) notice that their privacy was strictly protected; 2) notice that refusal to participate would not influence their work; 3) notice that participation was voluntary; 4) notice that the data would be presented only in aggregate form in professional journals; 5) as an advantage, assessment of one's own quality of life; 6) as a disadvantage, time spent responding to the questionnaires. Returning the questionnaire was regarded as consent to participate in the study. Participants did not receive any incentives to participate in this study.

Results

We obtained data from 3,829 nurses (response rate: 82%; response rates were comparable in each country) with a mean age of 33 ± 10 yr and mean nursing experience of 12 ± 11 yr. Majority of nurses were women (92%). Most were staff nurses (74%), worked in a ward (61%), and were on rotating shifts (86%).

Table 1 shows the results of the nurses' characteristics among the five countries. Nurses from Thailand were the oldest, those from Malaysia were the youngest, and these results were significant. Nurses from Thailand also had the most years of experience working with their particular units. Although most nurses were women (over 90% overall), Bhutan had the lowest percentage of female nurses

(70%). On the other hand, Bhutan had the highest number of nurses who were married and those who reported having a lot of household duties, while Singapore had the lowest numbers of nurses for both of these factors. Thailand's nurses reported the most social support, while Malaysia's nurses reported the least, and these results were significant. Bhutan reported the best stress coping abilities, while Japan reported the lowest. These results were also significant. Nurses from Thailand were the most highly educated. All had bachelor's degrees, and 14% had master's and doctoral degrees. Bhutan's nurses reported having the most working hours, and this result was significant. On the contrary, annual leave acquisition rates were the highest (91%) and 19% of them were currently attending school or taking courses in Singapore. Finally, Japanese nurses reported the highest job stress and the lowest life satisfaction as well as the lowest stress coping abilities, and these results were significant. Among the four other countries, except Japan, there were equitable job stress levels and stress coping abilities.

Total quality of life scores were compared among the different countries (Fig. 1). Bhutan yielded the highest scores (93 ± 11), followed by Malaysia (89 ± 11), Thailand (89 ± 10), Singapore (85 ± 11), and Japan (78 ± 12). Moreover, Japanese nurses' reported quality of life was even lower than the total mean score. Except Malaysia and Thailand, all other pairs were significantly different.

Table 2 shows that the variables that were significantly related to quality of life were "stress coping ability," "life satisfaction," "Japan," "social support," "job stress," and "Singapore" (adjusted R^2=0.46). "Age," "Malaysia," "Thailand," and "Bhutan" were not significantly related to quality of life. For our study, the county variables were selected as independent variables for the stepwise multivariate linear regression analysis, because the dynamic effect of each country was crucial.

Discussion

Our findings show that hospital-based nurses' quality of life differs across Asian countries and is not linked to country's economic status. The backgrounds of the countries are quite different due to cultural and educational dissimilarities. Japan had the highest job stress and the lowest life satisfaction and quality of life. Stress coping abilities and life satisfaction are strongly related to quality of life in relation to job stress. A distinction among the developed countries was that it was not all about reasons for acquiring a better quality of life.

Recently, nurses from developing countries have tended

**Table 1. Characteristics of nurses (n=3,829) in five countries**

Contents	Japan (n=1,201)	Singapore (n=1,040)	Malaysi (n=1,001)	Thailand (n=418)	Bhutan (n=169)	*p* value
Age (n=3,748)	37 ± 11	31 ± 9	29 ± 9	41 ± 10	31 ± 7	**
Sex (women) (n=3,808)	93%	93%	94%	97%	70%	**
Marital status (n=3,819)						
Married	51%	42%	54%	56%	57%	
Unmarried	44%	56%	43%	38%	38%	**
Divorced, etc.	5%	2%	3%	6%	5%	
Household duty						
Childcare (n=3,770)	36%	21%	38%	54%	56%	**
Housework (n=3,794)	74%	67%	73%	89%	90%	**
Caring for an older relative *et al.* (n=3,781)	10%	16%	20%	42%	29%	**
Social support level (n=3,685)	48 ± 7	45 ± 8	44 ± 9	50 ± 6	48 ± 8	**
Stress coping ability (n=3,655)	49 ± 10	54 ± 10	54 ± 7	52 ± 4	56 ± 11	**
Years of nursing experience (n=2,709)	15 ± 12	8 ± 8	5 ± 6	17 ± 10	8 ± 8	**
Education (n=3,806)						
Doctor's or Master's level	1%	2%	1%	14%	4%	
Bachelor's level	18%	48%	6%	86%	13%	
Diploma level	19%	40%	77%	0%	44%	**
Certificate (without degree)	62%	10%	15%	0%	5%	
Other	0%	0%	1%	0%	34%	
Job title (n=3,715)						
Manager or senior staff nurse	15%	23%	20%	11%	32%	
Staff nurse	81%	57%	80%	88%	58%	**
Enrolled nurse	3%	15%	0%	0%	10%	
Other	1%	5%	0%	1%	0%	
Type of employment (n=3,815)						
Full time permanent	94%	94%	89%	99%	96%	**
Temporary, part time, etc.	6%	6%	11%	1%	4%	
Unit type (n=3,765)						
Ward	67%	54%	59%	61%	68%	
Operation theatre/intensive care unit, etc.	12%	23%	36%	19%	30%	*
Outpatient department, etc.	21%	22%	5%	20%	2%	
Year length with the unit (n=3,663)	5 ± 6	3 ± 3	5 ± 5	13 ± 9	4 ± 4	**
Fixed shift (yes) (n=3,733)	41%	36%	44%	67%	40%	**
Working hours per week (n=3,436)	40 ± 15	43 ± 8	42 ± 16	36 ± 19	44 ± 9	**
Annual leave acquisition rate (n=1,699)	23%	91%	65%	No data	12%	*
Currently attend school or take courses (yes) (n=3,788)	2%	19%	8%	8%	5%	**
Job stress (n=3,463)	112 ± 14	97 ± 12	94 ± 10	97 ± 11	96 ± 12	**
Life satisfaction (n=3,691)	11 ± 2	12 ± 2	13 ± 2	13 ± 2	13 ± 2	**

*p<0.05, **p<0.01.

to travel to other countries to obtain a better quality of life. However, our results differ from this recent trend. Bhutan is a distinctive country in that it is known to have the highest gross national happiness (GNH; Bhutan proposed this idea first) in the world[38]. People in Bhutan strongly believe that happiness comes from your own heart, not from materials or money, so they spend much time in meditation and choose a simple lifestyle[38]. This psychological mindset might have affected our results. However, our study result was not related with the result from the United Nations' (UN) world happiness report[39] (ranking: Singapore [No. 26], Thailand [No. 32], Malaysia [No. 42], Japan [No. 51], and Bhutan [No. 97] out of 155 countries). The UN report considers social environmental status to assess happiness; nevertheless, the Bhutanese GNH idea arises from purely psychological elements to assess happiness. These different fundamentals for
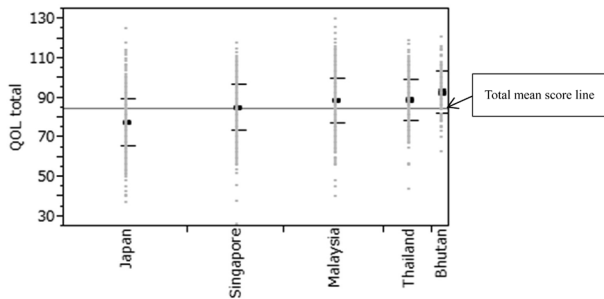
Fig. 1. Comparison of quality of life in five countries.
Except Malaysia and Thailand, all other pairs were significantly different. Bhutan yielded the highest score. Japan yielded the lowest score.

Table 2. Final regression analysis model predicting quality of life (n=2,880)

Variable	β	Standardized β	p-value
Stress coping ability	0.44	0.32	**
Life satisfaction	1.76	0.30	**
Japan	−6.23	−0.24	**
Social support	0.21	0.13	**
Job stress	−0.07	−0.08	**
Singapore	−2.13	−0.07	**

$R^2=0.46$, adjusted $R^2=0.46$.
**$p<0.01$.
"Age", "Malaysia", "Thailand", and "Bhutan" were not included.

assessment might affect incomparable description.

Work–life imbalance has also become a major issue worldwide, especially among developed countries[35]. Certainly, Japan and Singapore have highly equipped environments with advanced technology; nevertheless, they might have lost their traditional way of thinking aimed at simplification, life satisfaction, and enjoyment. Therefore, this indicates that spiritual interventions or life satisfaction improvements need to be developed to help maintain a better quality of life.

The predictors of quality of life as assessed in our study are fairly comparable with those of resent research[10, 11, 16–18, 22–24] with the exception of "Japan" and "Singapore." Understanding the differences in the countries' nursing environments and cultures adds richness to the global examinations of the diversity of health care teams. International observation is important for the identification of internal problems. For example, the main problem in Malaysia was that nurses were young and lacked degrees. The main problem in Thailand was that the nurses were older; their major focus is on producing more young nurses in Thailand. Bhutan had fewer registered nurses and a lack of equipment. These three countries' similar concerns were staffing, overcrowding, and an equipment shortage. Overall, surrounding material and economics are favorable in developed countries, but psychological strength seems to be firmed in the developing countries. Before making immigration decisions, nurses must consider comprehensively what really improves quality of life.

Hospital nurses are under high stress[11, 12]. High stress[40] is associated with emotional fatigue, insomnia, and burnout[41]. This situation causes burdens in patient care, increasing falls and medication errors[42]. Especially in Asia, karoshi (death from overwork) and karoujisatsu (suicide from overwork) are enormous concerns for workers[43]. One young nurse has already died from karoshi in Japan[44]. Our study showed the highest score of job stress in Japan. Work environment, known as workload, job control, job requirement, and mental demand, must be urgently improved since nurses' health is not in a respectable condition and adversely affects the health outcomes of patients.

Our study confirmed that stress coping ability was crucial for retaining quality of life. Certainly, job stress should be improved nationally as well as domestically. Along with job stress improvements, individual nurses' stress coping abilities also need to be improved[35], especially in Japan, because stress coping ability intensely correlates with quality of life[22]. The ability to cope with stress can be increased with support from people who have high stress coping abilities. Further research is needed to examine the methods people actually use to cope with a variety of stressors. This will provide valuable information on maintaining better quality of life at the individual level.

Concerning practical implications, the current study suggests that developed countries need to learn about how developing countries ensure life satisfaction and stress coping abilities. On the other hand, while nurses in developing countries continue to learn skills, among other things, it is important that they maintain their psychological strength. The backgrounds of nurses throughout Asia are rather different due to cultural and educational dissimilarities. Global observations may demonstrate a wider vision for tackling issues internationally.

One limitation of our study was that, because it was a cross-sectional study, causality was not established. Preexisting differences in characteristics may also influence differences in quality of life, although the ANCOVA method was used in this study. A future prospective study is necessary to explore factors related to quality of life. In addition, participants were not recruited nationally due to research funding limitations. However, our research demonstrated a cornerstone for globally examining hospital-

based nurses' quality of life.

In summary, our study found that hospital-based nurses' quality of life differs in different countries and is not linked to the country's economics. Japan had the highest job stress and the lowest life satisfaction and quality of life. Stress coping abilities and life satisfaction are strongly related to quality of life in relation to job stress. For nurses to maintain good quality of life, institutions should promote better work environments. An international exchange program for work environment and staff coping strategies, such as an international nursing conference, is recommended to broaden institutional minds so that they are able to realize their own problems and discover global solutions.

Acknowledgment

Funding

Conflict of Interest

We declare no conflicts of interest.

References

1) Chiu MC, Wang MJ, Lu CW, Pan SM, Kumashiro M, Ilmarinen J (2007) Evaluating work ability and quality of life for clinical nurses in Taiwan. Nurs Outlook **55**, 318–26.

2) Milosevic M, Golubic R, Knezevic B, Golubic K, Bubas M, Mustajbegovic J (2011) Work ability as a major determinant of clinical nurses' quality of life. J Clin Nurs **20**, 2931–8.

3) Horrigan JM, Lightfoot NE, Larivière MA, Jacklin K (2013) Evaluating and improving nurses' health and quality of work life. Workplace Health Saf **61**, 173–81, quiz 182.

4) Oyama Y, Fukahori H (2015) A literature review of factors related to hospital nurses' health-related quality of life. J Nurs Manag **23**, 661–73.

5) Lee YW, Dai YT, McCreary LL (2015) Quality of work life as a predictor of nurses' intention to leave units, organisations and the profession. J Nurs Manag **23**, 521–31.

6) Lee YW, Dai YT, Park CG, McCreary LL (2013) Predicting quality of work life on nurses' intention to leave. J Nurs Scholarsh **45**, 160–8.

7) Almalki MJ, FitzGerald G, Clark M (2012) The relationship between quality of work life and turnover intention of primary health care nurses in Saudi Arabia. BMC Health Serv Res **12**, 314.

8) Brown P, Fraser K, Wong CA, Muise M, Cummings G (2013) Factors influencing intentions to stay and retention of nurse managers: a systematic review. J Nurs Manag **21**, 459–72.

9) Carter MR, Tourangeau AE (2012) Staying in nursing: what factors determine whether nurses intend to remain employed? J Adv Nurs **68**, 1589–600.

10) Lambert VA, Lambert CE, Ito M (2004) Workplace stressors, ways of coping and demographic characteristics as predictors of physical and mental health of Japanese hospital nurses. Int J Nurs Stud **41**, 85–97.

11) Al-Homayan AM, Shamsudin FM, Subramaniam CRI (2013) Impacts of job demands on nurses' performance working in public hospitals. Am J Appl Sci **10**, 1050–60.

12) Matheson A, O'Brien L, Reid JA (2014) The impact of shiftwork on health: a literature review. J Clin Nurs **23**, 3309–20.

13) Aiken LH, Sloane DM, Bruyneel L, Van den Heede K, Griffiths P, Busse R, Diomidous M, Kinnunen J, Kózka M, Lesaffre E, McHugh MD, Moreno-Casbas MT, Rafferty AM, Schwendimann R, Scott PA, Tishelman C, van Achterberg T, Sermeus W, RN4CAST consortium (2014) Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. Lancet **383**, 1824–30.

14) Watanabe N, Furukawa TA, Horikoshi M, Katsuki F, Narisawa T, Kumachi M, Oe Y, Shinmei I, Noguchi H, Hamazaki K, Matsuoka Y (2015) A mindfulness-based stress management program and treatment with omega-3 fatty acids to maintain a healthy mental state in hospital nurses (Happy Nurse Project): study protocol for a randomized controlled trial. Trials **16**, 36.

15) Aust B, Rugulies R, Skakon J, Scherzer T, Jensen C (2007) Psychosocial work environment of hospital workers: validation of a comprehensive assessment scale. Int J Nurs Stud **44**, 814–25.

16) Cheng Y, Kawachi I, Coakley EH, Schwartz J, Colditz G (2000) Association between psychosocial work characteristics and health functioning in American women: prospective study. BMJ **320**, 1432–6.

17) Lambert VA, Lambert CE, Petrini M, Li XM, Zhang YJ (2007) Predictors of physical and mental health in hospital nurses within the People's Republic of China. Int Nurs Rev **54**, 85–91.

18) Wu SY, Li HY, Tian J, Zhu W, Li J, Wang XR (2011) Health-related quality of life and its main related factors among nurses in China. Ind Health **49**, 158–65.

19) Oyama Y, Yonekura Y, Fukahori H (2015) Nurse health-related quality of life: associations with patient and ward characteristics in Japanese general acute care wards. J Nurs Manag **23**, 775–83.

20) Cimete G, Gencalp NS, Keskin G (2003) Quality of life and job satisfaction of nurses. J Nurs Care Qual **18**, 151–8.

21) Augusto Landa JM, López-Zafra E, Berrios Martos MP, Aguilar-Luzón MC (2008) The relationship between emotional intelligence, occupational stress and health in nurses: a questionnaire survey. Int J Nurs Stud **45**, 888–901.

22) Chang EM, Daly J, Hancock KM, Bidewell JW, Johnson A, Lambert VA, Lambert CE (2006) The relationships among workplace stressors, coping methods, demographic characteristics, and health in Australian nurses. J Prof Nurs **22**, 30–8.

23) Lambert VA, Lambert CE, Itano J, Inouye J, Kim S, Kuniviktikul W, Sitthimongkol Y, Pongthavornkamol K, Gasemgitvattana S, Ito M (2004) Cross-cultural comparison of workplace stressors, ways of coping and demographic characteristics as predictors of physical and mental health among hospital nurses in Japan, Thailand, South Korea and the USA (Hawaii). Int J Nurs Stud **41**, 671–84.

24) Chang EM, Bidewell JW, Huntington AD, Daly J, Johnson A, Wilson H, Lambert VA, Lambert CE (2007) A survey of role stress, coping and health in Australian and New Zealand hospital nurses. Int J Nurs Stud **44**, 1354–62.

25) D Sherwood G, Shaffer FA (2014) The role of internationally educated nurses in a quality, safe workforce. Nurs Outlook **62**, 46–52.

26) Makabe S, Kowitlawakul Y, Nurumal MS, Takagai J, Wichaikhum O, Wangmo N, Foon YS, Kunaviktikul W, Komatsu J, Shirakawa H, Kimura Y, Asanuma Y (2017) The ANQueSt (Asian Nurse Quality of life Study) to compare quality of life and identify related variables: study protocol for a cross-sectional design. J Clin Trials **7**, 1–4.

27) Statistics GNIGross Domestic Product International Ranking 2017 based on United Nations statistics. http://www.globalnote.jp/p-data-g/?dno=20&post_no=12796. Accessed April 13, 2017.

28) Statistics GNIGross National Income International Ranking 2017 based on United Nations statistics. http://www.globalnote.jp/p-data-g/?dno=260&post_no=1353. Accessed April 13, 2017.

29) Nakata A, Ikeda T, Takahashi M, Haratani T, Hojou M, Fujioka Y, Swanson NG, Araki S (2006) Impact of psychosocial job stress on non-fatal occupational injuries in small and medium-sized manufacturing enterprises. Am J Ind Med **49**, 658–69.

30) Hogg RV, Tanis EA (2001) Probability and statistical inference: the central limit theorem, 6th ed., 307–314, Prentice-Hall, New Jersey.

31) Number of nurse and midwife ranking 2017. http://top10.sakura.ne.jp/WHO-HRH-24.html, Accessed Aug 19, 2017 (in Japanese).

32) Number of nurse and midwife per 1000 of the Population ranking 2017. http://top10.sakura.ne.jp/WHO-HRH-33.html, Accessed Aug 19, 2017 (in Japanese).

33) Skevington SM, Lotfy M, O'Connell KA Group W, WHOQOL Group (2004) The World Health Organization's WHOQOL-BREF quality of life assessment: psychometric properties and results of the international field trial. A report from the WHOQOL group. Qual Life Res **13**, 299–310.

34) Hurrell JJ Jr, McLaney MA (1988) Exposure to job stress— a new psychometric instrument. Scand J Work Environ Health **14** Suppl 1, 27–8.

35) Makabe S, Takagai J, Asanuma Y, Ohtomo K, Kimura Y (2015) Impact of work-life imbalance on job satisfaction and quality of life among hospital nurses in Japan. Ind Health **53**, 152–9.

36) Holmefur M, Sundberg K, Wettergren L, Langius-Eklöf A (2015) Measurement properties of the 13-item sense of coherence scale using Rasch analysis. Qual Life Res **24**, 1455–63.

37) Sugiyama T, Fujikoshi Y, Sugiura N, Kunitomo N (2007) Toukei data Kagakujiten. Asakura syoten, Tokyo (in Japanese).

38) Tobgay T, Dophu U, Torres CE, Na-Bangchang K (2011) Health and gross national happiness: review of current status in Bhutan. J Multidiscip Healthc **4**, 293–8.

39) United Nations World Happiness Report 2017. http://worldhappiness.report/wp-content/uploads/sites/2/2017/03/HR17.pdf. Accessed April 26, 2017.

40) Letvak S, Ruhm CJ, McCoy T (2012) Depression in hospital-employed nurses. Clin Nurse Spec **26**, 177–82.

41) Gershon RR, Stone PW, Zeltser M, Faucett J, MacDavitt K, Chou SS (2007) Organizational climate and nurse health outcomes in the United States: a systematic review. Ind Health **45**, 622–36.

42) Letvak SA, Ruhm CJ, Gupta SN (2012) Nurses' presenteeism and its effects on self-reported quality of care and costs. Am J Nurs **112**, 30–8, quiz 48, 39.

43) Yang Z, Yang B, Li J (2015) Perspectives on compensation and legislation of death due to work overload—karoshi. QJM **108**, 349–50.

44) Mizuno-Lewis S, McAllister M (2008) Taking leave from work: the impact of culture on Japanese female nurses. J Clin Nurs **17**, 274–81.