

ORIGINAL ARTICLE

Korean Work Environment Scales for Clinical Nurses

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Abstract

Aim: The aim of this study was to develop an assessment tool for the hospital nursing work environment in Korea.

Methods: The participants were 564 clinical nurses who worked in 13 hospitals in seven provinces in regions throughout South Korea; they worked in medical–surgical nursing, pediatric and maternal nursing, intensive care unit, and other areas. The data analysis relied on descriptive analysis and exploratory factor analysis, including varimax rotation, and reliability was determined using SPSS software.

Results: The final assessment tool, the Korean Work Environment Scales for Clinical Nurses (KWES-CN) was composed of 39 items divided into nine factors: (i) manager leadership; (ii) supporting environment for nursing work; (iii) patient care environment and professional activities; (iv) violence within ward; (v) sufficient inventory and supply; (vi) hospital's support for working environment; (vii) recognition and respect; (viii) satisfaction with work schedule; and (ix) computer problems. The total variance for validity described by the nine factors was 58.7% and the reliability of the tool was a Cronbach's alpha of 0.87.

Conclusion: This final assessment tool will be used to improve nursing work. Further research must be conducted to verify the reliability and validity of this tool, and evaluations of nursing quality and patient results related to the nursing environment.

Key words: environment, hospital, Korea, nurse, work.

INTRODUCTION

Recently, a severe shortage of clinical nurses has increased demands for an improved, healthy nursing work environment (Duddle & Boughton, 2008). There is a proposed correlation between nursing work environment and outcomes such as job satisfaction, job turnover rate, and patient results, leading hospitals to consider changes to the work environment of nurses (Haynes, 2008).

Generally, “environment” can be categorized into the natural environment and artificial environment. The

artificial environment includes physical, social, and mental aspects. Westerman and Simmons (2007) state that the work environment refers to the atmosphere of the workplace and includes ways for an organization to maintain its organizational system, participation in decision-making processes, opportunities for growth through improved autonomy, and interactions among individuals relating to work performance.

Therefore, the nursing work environment is the environment in which nurses work. It includes maintenance of the nursing organizational system, participation in decision-making and autonomy, and interaction among fellow nurses. It is a comprehensive concept that also includes the physical work environment (break times, lighting, heating and cooling systems, ventilation system) and structural problems of hospital wards (Parsons, Cornett, & Golightly-Jenkins, 2006). Aiken and Patrician (2000) defined the work environment of

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nursing professionals as characteristics of an organization which help nurses provide a high level of nursing care to patients. Lake (2002) defined it as a comprehensive concept including elements such as nurses' participation in hospital policy-making, the presence of foundations of nursing that ensure quality of care, and nurses' relationships with medical staff and patients. The nursing work environment also includes aspects of the human environment, such as interaction among individuals that affect work performance (Friese, Lake, Aiken, Silber, & Sochalski, 2008).

The importance of the nursing work environment has been stressed by many researchers. Aspects of the work environment, management of the organization, work design, organizational culture, and nurse staffing have impact on patient safety. Nurses' workload, work hours, nurse-to-patient ratios, mandatory overtime, poorly designed workplaces, exhaustion of nurses, nurse autonomy, the quality of the relationship between nurses and doctors, whether the nursing service is based on nursing standards, the nurse manager's attitude, and opportunities for professional development are related to decreased medication error rate, patient fall rate, and the fatality rate of inpatients. Furthermore, higher patient satisfaction and higher nursing work performance have been reported in the hospitals where nurses have a positive perception of their work environment (Friese *et al.*, 2008; Institute of Medicine, 2004; Kazanjian, Green, Wong, & Reid, 2005).

The most widely used tools to assess the nursing work environment have been the Work Environment Scale-10 (WES-10), Nursing Work Index (NWI), Nursing Work Index-Revised (NWI-R), and Practice Environment Scale-Nursing Work Index (PES-NWI). The NWI-R is a revised version of the NWI published by Aiken and Patrician (2000) that reflects the organizational characteristics of nursing service that affect patient results. It considers the relationship between nurses and doctors, nursing management at the ward level, hospital management, and organizational support. Because of their drawback of being too lengthy, Lake (2002) selected 31 common questions from the NWI and NWI-R and created the PES-NWI. The PES-NWI is composed of five subscales: (i) nurse participation in hospital affairs; (ii) nursing foundations for quality of care; (iii) manager's ability, leadership, and support of nurses; (iv) staffing and resource adequacy; and (v) collegial nurse-physician relations (Cho, Choi, Kim, Yoo, & Lee, 2011).

Although the PES-NWI was recently translated into Korean (Cho *et al.*, 2011), it has some limitations for

measuring Korean nurses' work environment appropriately, because the NWI was made from data collected from Magnet hospitals in the 1980s. Also, the PES-NWI gives weight to the nurse participation in hospital affairs subscale with nine out of 29 questions. However, in Korea, staff nurses usually are not able to participate in hospital affairs. For example, questions concerning whether staff nurses have the opportunity to serve on hospital and nursing committees, whether staff nurses are involved in the internal governance of the hospital, and if staff nurses are given the opportunity to participate in policy decisions in the PES-NWI are not appropriate to reflect the current state of limited access of nurses to hospital management in Korea. Even Cho *et al.* (2011) had mentioned that the partial PES-NWI was used in advanced research in Korea. Above all, the PES-NWI measures mainly the socio-psychological environment, not the physical environment, so it is not sufficient to reflect the culture and working condition of Korean nurses. When Liou and Cheng (2009) assessed the work environment of Asian nurses in the USA with the PES-NWI, they presented four subscales in the factorial analysis due to cultural differences.

Therefore, repetitive verification of the validity of the tools is necessary to apply nursing work environment assessment tools developed in other countries to the nursing field in Korea. The validity and sensitivity of the evaluation tools could suffer if translated versions of tools developed in and based on the characteristics of the nursing work environment of foreign countries were used. Thus, it is necessary to develop an assessment tool that reflects the cultural characteristics of the nursing work environment of Korean hospitals in order to appropriately evaluate and improve the nursing work environment of domestic hospitals. Based on recent research on nursing work environments, the present authors aimed to develop such a model that reflects the characteristics of the nursing work environment in Korea. The authors explored the concept of nursing work environment and derived the criteria of a nursing work environment from it to develop a tool that can be used to evaluate nursing work environments in Korea.

METHODS

Study design

The present paper is the result of methodological research that clarifies the nature of the work environment of nurses in Korean hospitals, derives evaluation

items, and tests the validity and reliability of the assessment tool.

Setting and samples

Participants of this study were limited to nurses with over 1 year of experience in present general wards of general hospitals with over 200 beds and located in Korea. It has been suggested that to adequately assess factorial validity in psychometric testing of an instrument, there should be 10 respondents for each item (Nunnally, 1978). The instrument at this point contained a total of 47 items except for demographic information. Therefore, the authors assumed that a total of 470 individuals would be appropriate. Considering some possible dropouts, the authors invited 600 nurses in general hospitals across the country to participate in the survey (Seoul, Busan, Daejeon, Chungcheong, Kyungsang, Jeolla, and Jeju), and those hospitals that took part in the pilot survey were excluded.

After obtaining permission from the institutional review board of university “E” (IRB no. EU 12–13) on 24 July 2012, the authors collected data from nurses in 13 general hospitals across the country between 20 August and 30 September 2012. Researchers either personally visited hospitals or made phone calls to explain the purpose of the research and ask for their agreement to participate. To the hospitals willing to participate, the authors then sent their research plan, including the purpose of the research, a copy of the written acknowledgment from the IRB, and survey questions, via email and received definite answers regarding their intention to participate. To some hospitals, the packages of survey questions and gifts of thanks were personally distributed or sent by mail. Each survey was accompanied by the purpose and possible applications of the survey. The authors received consent to participate from each subject. The response rate of the survey was 95%: the authors distributed 600 surveys and received 573 responses from nurses in 13 hospitals. Excluding nine surveys that failed to meet the authors’ selection criteria or contained insincere answers, finally, the authors used 564 surveys for analysis for this study.

Procedure

The developmental stages of the assessment tool for nursing work environment are illustrated in Figure 1. There are two sections: (i) the development of the instrument to assess nursing work environment; and (ii) the process of validation and reliability testing for the developed instrument.

Section 1: the process of development for instrument of nursing work environment

Stage 1: published work review. To develop the assessment tool for the Korean nursing work environment, the authors conducted a published work review of previous studies and related documents (see references) including existing tools measuring working environments from the search results of CINAHL, MEDLINE, Korean Studies Information Service System (KISS), and National Assembly Electronic Library databases using keywords “working environments”, “nursing tasks”, and “nursing practice”. The tools measuring nursing working environments were the WES-10, NWI, PES-NWI, NWI-R, Healthy Work Environment, Healthy Practice/Work Environment Measurement, Agency for Healthcare Research and Quality (AHRQ) tools, Working Environment Measuring Tool, Inappropriate Working Environments, and Non-nursing Working Environments measuring tool in long-term nursing institutions. The safety reporting system and medical information management and supporting environments were the parts related to nursing work environments out of hospital accreditation elements. Detailed areas of nursing work environments specified in those articles were participation of nurses in hospital issues, nursing foundation areas, the ability and leadership of nurse managers, appropriateness of workforce and material resources, the relationship between nurses and doctors, and several others. The tools that were primarily used were the WES-10, NWI, and PES-NWI.

Donabedian (2005) defined the quality healthcare along three basic dimensions: (i) structure; (ii) process; and (iii) outcomes of care. The structure of care includes the adequacy of facilities and equipment, and administrative structure and operations related to programs providing care. The processes of care are actions/services involved with direct care. The outcomes of care are consequences that can be attributed to the structure and process. Based on this theoretical framework and previous research, Donabedian’s model was implemented as a conceptual framework in assessing quality of health care. This model was also employed to evaluate patient safety and healthcare service, and later the results were used as a foundation to propose plans to enhance the quality of nursing based on the assessment of the nursing work environment. The authors classified the nursing environment into two aspects: (i) structure; and (ii) process. The structure aspect includes physical, psychosocial, and economic environments. The process aspect includes the leadership of nurse managers, nurses’

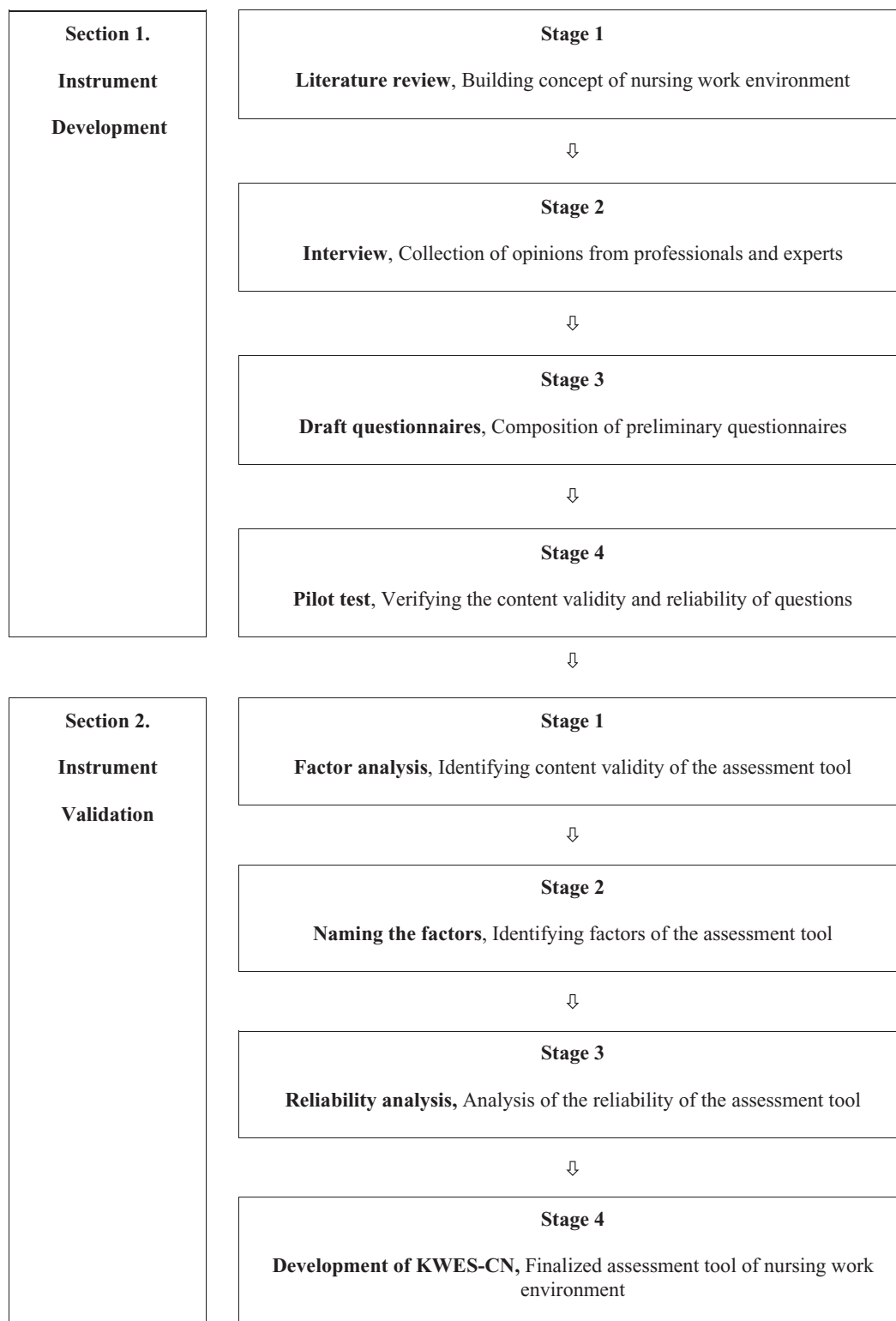


Figure 1 Development process for Korean Work Environment Scales for Clinical Nurses (KWES-CN).

relationships, and nurses' participation in nursing work activities.

Stage 2: collection of opinions from professionals and experts. Second, the authors collected experts' opinions to help develop the assessment tool. The authors interviewed 47 doctorate degree nurses majoring in nursing management, nurse managers or experienced nurses (career, >10 years), clinical nurses, and other hospital staff, and their opinions were collected through individual interviews by allowing them to express their opinions freely. Their opinions were collected by asking "What do you think of the nursing working environments?", "What are the areas of nursing working environments?", and "What items should be included in the questions to measure nursing work environments?" to develop a nursing work environments measurement tool. Definition, dimensions, and items of nursing work environments deduced were physical elements including rest area of nursing working environments, movement, distance and traffic conditions, emotional elements, human elements, professional works, interpersonal relationships, and environmental elements. Based on subcategories used in foreign assessment tools, the authors defined the nursing work environment as a comprehensive concept that included physical, emotional, human, professional, relational, and environmental elements. Then, the nursing work environment was divided into structure and process. The structure environment included four subcategories: (i) hospital environment; (ii) physical environment; (iii) psychosocial environment; and (iv) economic environment. The process environment included three subcategories: (i) leadership; (ii) relationships; and (iii) participation.

Stage 3: composition of preliminary questionnaires for the assessment tool. Third, preliminary questions were composed based on the conceptual framework of the tool derived from the published work review and collection of experts' opinions. The total of 49 questions consisted of 29 questions about structure environment and 20 questions about process environment. The former included three items of hospital environment, 10 items of physical environment, 12 items of psychosocial environment, and four items of economic environment questions. The 20 questions of process environment included six items of leadership, nine items of relationships, and five items of participation.

Stage 4: pilot test for verifying the content validity and reliability. As the fourth stage, a pilot survey was

conducted with the written preliminary questionnaires. Twenty-two experts each with over 10 years of clinical experience in hospitals responded to verify the content validity of the preliminary questions. Their answers were rated on a 4 point Likert scale: 1, very unsuitable; 2, unsuitable; 3, suitable; and 4, very suitable. They were asked to present their own opinions or even make suggestions for any possible change or revision of the given questions if they found any question incomprehensible or problematic.

To test the content validity of the preliminary questions on the nursing work environment, the authors employed an item-level content validity index (I-CVI), which computed the proportion of 3 or 4 point answers by the experts. Only one question had an I-CVI score less than 0.75: the statement "It is convenient to commute to the hospital" scored 0.39. Thus, this question was changed to "My hospital provides administrative support to ease commuting (shuttle bus, adjusting work hours, etc.)". Additionally, the three questions about hospital environment were deleted and modified because they focused more on personal characteristics than the work environment, even though they had high I-CVI ratings.

After in-depth discussion of the information provided by the experts, the authors completed the final version of the assessment tool. It consisted of a total of 47 questions: five on hospital characteristics, six on physical environment, 13 on psychosocial environment, and three economic environment items from the area of structure environment; and six on leadership, nine on relationships, and five on participation items from the process environment. To test and confirm the reliability of the finalized version, a series of pilot surveys were conducted with 30 nurses in "B" hospital in Busan on 12 August 2012. Its overall Cronbach's alpha reliability value was 0.69.

Section 2: process of validation and reliability for the developed instrument

Stage 1: identifying content validity of the assessment tool. The construct validity of the 47 questions from this scale was confirmed through an exploratory factor analysis. After the first round of the analysis, eight items were revealed to have a factor loading below 0.40 and were deleted.

Stage 2: identifying factors of the assessment tool. The research team discussed naming the nine factors used in the survey. One working principle was to select a word or phrase that would effectively represent the content of

all the items belonging to that category, with the greatest factor load.

Stage 3: analysis of the reliability of the assessment tool. The internal consistency reliability of the scale was established with Cronbach's alpha coefficients. A reliability coefficient of 0.70 or above is accepted as evidence of internal consistency of new instruments (Nunnally, 1978). The Cronbach's alpha was 0.87 for total scale, which is an acceptable value.

Stage 4: finalized assessment tool of nursing work environment. After determining the content validity and conducting the reliability test, the 39 items highlighting the nine factors were arranged in the nursing work environment for Korean clinical nurse.

Data analysis

The authors analyzed the collected data as follows. First, the authors used descriptive statistics to obtain numbers, percentages, averages, and standard deviations with regard to common characteristics of the subjects and variables of each question. Second, the content validity of the assessment tool was calculated using the I-CVI scale, and Cronbach's alpha coefficient was calculated to confirm its internal consistency. Third, the authors performed Kaiser–Meyer–Olkin (KMO) and Bartlett's sphericity tests to verify the appropriateness of the data for factor analysis. Construct validity was obtained from item analysis and principal component analysis using varimax factor rotation with factor extraction based on the eigenvalue of 1.

Language adaptation

The English version of the Korean Work Environment Scales for Clinical Nurses (KWES-CN) in Korean was developed through the translation/back-translation methodology. A team of professional native English translators translated the Korean version into English, and back-translation into Korean was performed by Foreign Language Editing Services. Next, the research team compared the back-translated version with the original to identify equivalent or non-equivalent items.

RESULTS

The results of main survey are as follows:

General characteristics of participants

The general characteristics of the research subjects are shown in Table 1. A total of 564 research subjects

participated in the study; 176 (31.2%) worked in large hospitals with over 1000 beds and 88 (15.6%) in hospitals with 200–299 beds. A total of 336 (59.6%) worked in internal medicine and surgery, 123 (21.8%) worked in the gynecology and pediatric unit, 70 (12.4%) in the intensive care unit, and 31 (5.5%) worked in the operation room or emergency room.

Verification of the validity of the assessment tool

Appropriateness of factorial analysis and construct validity of the assessment tool

The construct validity of the 47 questions in this scale was confirmed through exploratory factor analysis. The KMO index was 0.89, which was close to 1 and which showed the appropriateness of the factor analysis model. The authors found significant differences in Bartlett's sphericity test, which also showed the appropriateness of the questions ($P < 0.001$, $\chi^2 = 7455.94$). Varimax rotation was used for factor analysis to minimize the number of variables with high loads. As a consequence, there were nine variables with eigenvalues over 1.0. It is desirable for the factor loading to be greater than 0.4 to appropriately indicate the significance of the given variables (Hair, Anderson, Tatham, & Black, 1998), so only those categories with values over 0.4 were selected as final items, as illustrated in Table 2. The eight items with factor loading of below 0.40 (i.e. 31, 32, 33, 8, 1, 10, 18, and 29) were deleted. The total variance described by the nine factors with 39 items was 58.7%.

Identifying factors of the assessment tool

The team of four professors and a doctoral student in nursing management who participated in arranging the questions for the pilot survey had a discussion to name the nine factors used in the survey. One working principle was to select a word or phrase that would well represent the content of all the items belonging to that category, with the focus on the item with the greatest factor load (Table 2).

In the first factor, the items showing large factor loads were the statements: (1) "My nurse manager encourages me to develop continuously", (2) "Our nurse manager fairly addresses conflict among nurses, doctors, and other departments", (3) "Our nurse manager discusses routine problems and procedures with nurses", (4) "Our nurse manager is supportive of nurses working in the nursing unit", (5) "Our nurse manager suggests possible future opportunities to me as a nurse", (6) "Our nursing

Table 1 General characteristics of participants ($n = 564$)

Characteristics	Categories	N	%	Mean \pm SD
Age (years)	<Under 25	186	33.0	29 \pm 6.36
	26–30	183	32.4	
	31–35	99	17.6	
	36–40	50	8.9	
	≥ 41	43	7.6	
Sex	Female	542	96.1	
	Male	20	3.5	
Marital status	Single	266	47.2	
	Married	252	44.7	
	Others	43	7.6	
Religion	Yes	269	47.7	
	No	292	51.8	
Education Background	3 years of college	266	47.2	
	4 years of college	252	44.7	
	Graduate level	43	7.6	
Career (years)	1–5	329	58.3	5.9 \pm 5.93
	6–10	119	21.1	
	11–15	62	11.0	
	≥ 16	51	9.6	
Department	Medical/surgical	336	59.6	
	Gynecological/pediatric	123	21.8	
	Intensive care unit	70	12.4	
	Others [†]	31	5.5	
Position	Nurse	485	86.0	
	Charge nurse	49	8.7	
	Head nurse	27	4.8	
Hospital beds	200–299	88	15.6	
	300–499	130	23.0	
	500–999	170	30.1	
	≥ 1000	176	31.2	

Missing responses are excluded. [†]Psychiatric unit, five; operating room, 12; emergency room, 14. SD, standard deviation.

manager applauds and recognizes nurses when they are doing well”, and (7) “Our nurse manager is open to discusses my job performance”. These items reflect leadership characteristics, and thus it is named the factor “manager leadership”.

The items with larger loads in the second factor were the statements: (8) “Our nursing unit has enough meal time”, (9) “Our nursing unit mandates rest periods for nurses”, (10) “Our nursing unit has enough nursing manpower for nursing care”, (11) “I think that I have an appropriate salary in this hospital”, (12) “Our nursing unit has proper work flow for nursing work”, (13) “In our nursing unit, nurses follow specific criteria for nursing performance evaluation”, and (14) “I have enough time and opportunities to discuss patient care with my peer nurses”. This factor was named

“supporting environment for nursing work” because these items encompass workforce and break times.

In the third factor, the items that had greater loads were (15) “I apply nursing processes in my nursing care”, (16) “I do nursing care by following standard nursing guidelines”, (17) “Our nursing unit uses an effective preceptor system”, (18) “I participate in decision-making related to nursing”, (19) “In our nursing unit, nurses care for the same patient if possible to ensure continuity of patient care”, and (20) “I have time for activities, such as preparing hospital accreditation, attending conferences, and conducting research”. Thus, this factor was named “patient care environment and professional activities” because the items contain standards and processes of caring for patients and participation in professional development.

Table 2 Result of factor analysis and accumulative variance

No.	Original item no.	Factor and component									Accumulative variance (%)	Eigenvalue
		1	2	3	4	5	6	7	8	9		
1	28	0.75	0.19	0.22	0.01	0.02	0.08	0.04	0.04	0.06	23.6	9.22
2	24	0.73	0.02	0.08	0.01	0.18	0.08	0.10	0.08	0.03		
3	25	0.73	0.04	0.02	0.05	0.00	0.05	0.13	0.15	0.09		
4	23	0.73	0.07	0.08	0.05	0.18	0.06	0.08	0.06	0.06		
5	26	0.72	0.20	0.17	0.08	0.01	0.05	0.08	0.06	0.10		
6	27	0.70	0.01	0.13	0.06	0.03	0.08	0.13	0.10	0.21		
7	22	0.54	0.32	0.24	0.11	0.20	0.06	0.07	0.12	0.36		
8	15	0.11	0.73	0.03	0.08	0.08	0.07	0.09	0.08	0.05	30.6	2.72
9	19	0.04	0.73	0.01	0.05	0.05	0.13	0.09	0.03	0.04		
10	9	0.11	0.58	0.12	0.06	0.33	0.04	0.10	0.25	0.11		
11	20	0.09	0.54	0.16	0.03	0.34	0.24	0.08	0.01	0.07		
12	2	0.07	0.49	0.06	0.12	0.13	0.12	0.16	0.13	0.03		
13	21	0.21	0.44	0.41	0.06	0.28	0.14	0.08	0.04	0.19		
14	11	0.17	0.44	0.37	0.10	0.11	0.02	0.16	0.07	0.04		
15	41	0.16	0.03	0.74	0.03	0.00	0.18	0.15	0.03	0.01	37.0	2.48
16	42	0.20	0.13	0.72	0.09	0.05	0.12	0.10	0.11	0.03		
17	7	0.08	0.13	0.64	0.05	0.23	0.08	0.08	0.14	0.19		
18	40	0.20	0.05	0.56	0.04	0.09	0.09	0.43	0.05	0.09		
19	13	0.09	0.35	0.42	0.04	0.17	0.19	0.09	0.40	0.15		
20	12	0.02	0.33	0.41	0.22	0.05	0.06	0.04	0.32	0.02		
21	36	0.04	0.04	0.02	0.85	0.07	0.02	0.06	0.00	0.05	42.0	1.95
22	37	0.05	0.05	0.04	0.85	0.03	0.06	0.00	0.03	0.08		
23	35	0.09	0.05	0.03	0.77	0.01	0.08	0.15	0.01	0.15		
24	34	0.11	0.27	0.10	0.50	0.08	0.06	0.12	0.13	0.17		
25	3	0.12	0.20	0.03	0.07	0.83	0.07	0.05	0.02	0.02		
26	4	0.22	0.20	0.07	0.04	0.72	0.08	0.14	0.16	0.03		
27	6	0.04	0.12	0.27	0.06	0.59	0.07	0.05	0.06	0.13		
28	44	0.11	0.29	0.04	0.05	0.05	0.68	0.04	0.19	0.06	49.3	1.38
29	46	0.15	0.13	0.30	0.07	0.15	0.64	0.22	0.23	0.14		
30	45	0.16	0.07	0.25	0.08	0.19	0.62	0.13	0.29	0.15		
31	43	0.02	0.42	0.16	0.02	0.00	0.49	0.13	0.21	0.02		
32	47	0.28	0.34	0.18	0.06	0.02	0.38	0.16	0.11	0.03		
33	38	0.17	0.26	0.10	0.05	0.07	0.15	0.79	0.06	0.00	52.8	1.36
34	39	0.18	0.20	0.18	0.01	0.19	0.00	0.78	0.07	0.04		
35	30	0.34	0.08	0.07	0.29	0.06	0.17	0.40	0.12	0.09		
36	17	0.25	0.22	0.02	0.02	0.09	0.11	0.10	0.61	0.25		
37	16	0.42	0.04	0.00	0.13	0.12	0.20	0.05	0.54	0.20		
38	14	0.16	0.45	0.26	0.03	0.02	0.02	0.05	0.51	0.06		
39	5	0.06	0.10	0.04	0.10	0.10	0.10	0.02	0.19	0.79	58.7	1.03

The fourth factor was identified as “violence within the ward” because the items included (21) “I have experienced verbal and/or physical violence by employees of other departments in my current unit”, (22) “I have experienced verbal and/or physical violence by doctors in my current unit”, (23) “I have experienced verbal and/or physical violence by peer nurses in my current unit”, and (24) “I have experienced verbal and/or

physical violence by patients or family members in my present unit”.

In the fifth factor, the items with greater loads were (25) “Our nursing unit has enough medical equipment”, (26) “Our nursing unit has enough medical materials”, and (27) “Our nursing unit has enough computers for nursing care”. Thus, the authors named it “sufficient inventory and supply”.

The sixth factor contained the items, (28) “Our hospital has good facilities for nurses”, (29) “Our hospital regards the safety of employees as very important”, (30) “Our hospital has a reporting system for injuries during work”, (31) “Our hospital provides administrative support for attendance and leaving”, and (32) “Our hospital uses a fair promotion system”. This category was named “hospital’s support for working environment”.

The items with greater loads in the seventh factor were (33) “I am happy working in my current unit”, (34) “I feel worthwhile working in my current unit”, and (35) “In our nursing unit, peer nurses have a respectful attitude”. This category was named “recognition and respect”.

The eighth factor concerned “satisfaction with work schedule” and contained the items (36) “Our nursing unit has an easy policy for changing the duty schedule”, (37) “Our unit accepts requests for personal duty schedule”, and (38) “Our nursing unit provides enough off-duty and vacation time”.

Finally, the ninth factor, “computer problems”, contained the item (39) “Computer problems occur while working in our unit (slower speed and malfunctioning)”.

Analysis of the reliability of the assessment tool

The internal consistency reliability of the scale was 0.87 for the total scale, which is at an acceptable level. Cronbach’s alpha was 0.86 for factor 1 of the tool, 0.79 for factor 2, 0.70 for factor 3, 0.76 for factor 4, 0.70 for factor 5, 0.69 for factor 6, 0.71 for factor 7, and 0.63 for factor 8. Factor 9 was composed of one item, so it could not have a Cronbach’s alpha. The overall average score of the nine factors was 2.58 (± 0.31), and ranged 2.19–2.88 (scale, 1–4) (Table 3).

Finalized nursing work environment assessment tool for Korean hospitals

Ultimately, this current assessment tool was named the “Korean Work Environment Scales for Clinical Nurses (KWES-CN)”. It was based on a 4 point Likert scale: 1 for “strongly disagree”, 2 for “disagree”, 3 for “agree”, and 4 for “strongly agree”. The range of scores was 39 to 156; with the higher score indicating a better nursing work environment. The items regarding violence within the ward (questions 34, 35, 36, and 37) and computer problems (question 5) were calculated in the opposite way.

DISCUSSION

The present study was conducted to develop a nursing work environment assessment tool for Korean hospitals. This section discusses the meaning of the developed tool and some differences from other existing tools, with a focus on its reliability and validity. The nursing work environment reflects the standard and status of nurses as professionals, and it has its value in helping nurses provide high-quality patient nursing. Therefore, to the extent that the nursing work environment is perceived as supportive by nurses, exhaustion and job turnover decrease and job satisfaction increases. In the USA, the shortage of nurses is closely related to exhaustion in young nurses (Aiken *et al.*, 2001), and as developed societies continue to age, the shortage of nurses will continue and the age of licensed nurses will naturally increase. Therefore, it is essential that the authors identify the shortcomings of nursing work environments and redesign them as necessary (Eaton-Spiva *et al.*, 2010).

The average age of active nurses in Korea is 32.7 years (Korean Nurses Association, 2006) and the average age of the present research subjects was 29.6. This is much younger than the average age of nurses in the USA of 46.8 years (American Nurses Association, 2012). US researchers have long recognized the necessity of improving the nursing work environment due to the shortage of nurses and the aging phenomenon (Eaton-Spiva *et al.*, 2010). However, even if the same tool was used to assess nursing work environments in different demographic groups, significant differences were found in the perception of the working environment between Americans and Asian Americans (Liou & Cheng, 2009). Additionally, differences in working environments clearly exist even in countries with similar cultures, such as the USA, Canada, and the UK (Aiken *et al.*, 2001).

Therefore, the authors designed the current tool to reflect the conditions of Korean hospitals. It was based on Donabedian’s (2005) definitions of structure, process, and outcome regarding the quality of health care, as well as a published work review and a pilot test of validity by experts. Then, the authors derived items related to the two dimensions of structure and process. For the aspects of structure, the authors considered physical environment, workforce, work load, work hours, equipment supply, information, welfare and reward, and safety. The items for the process aspect contained questions regarding leadership, communication, decision-making, authority/power, violence, acknowledgment, compliments, satisfaction, diversity,

Table 3 Reliability and average of final measurement for nursing work environment

		Factor items (definition)	Mean \pm SD	Cronbach's alpha if item deleted	Cronbach's alpha
		Factor 1: Manager leadership (manager's behavior, role, vision, and character)			
1	28	My nurse manager encourages me to develop continuously	2.88 \pm 0.40	0.87	0.86
2	24	Our nurse manager fairly addresses conflict among nurses, doctors, and other departments		0.87	
3	25	Our nurse manager discusses routine problems and procedures with nurses		0.87	
4	23	Our nurse manager is supportive of nurses working in the nursing unit		0.87	
5	26	Our nurse manager suggests possible future opportunities to me as a nurse		0.87	
6	27	Our nursing manager applauds and recognizes nurses when they are doing well		0.87	
7	22	Our nurse manager is open to discusses my job performance		0.87	
		Factor 2: Supporting environment for nursing work (sufficient time, workforce, opportunity, and evaluation to provide nursing care)			
8	15	Our nursing unit has enough meal times	2.19 \pm 0.46	0.87	0.79
9	19	Our nursing unit mandates rest periods for nurses		0.87	
10	9	Our nursing unit has enough nursing manpower for nursing work		0.87	
11	20	I think that I have an appropriate salary in this hospital.		0.87	
12	2	Our nursing unit has proper work flow for nursing care		0.87	
13	21	In our nursing unit, nurses follow specific criteria for nursing performance evaluation		0.87	
14	11	I have enough time and opportunities to discuss patient care with my peer nurses		0.87	
		Factor 3: Patient care environment and professional activities (standards and processes of caring for patients and having time for professional development)			
15	41	I apply nursing processes in my nursing care	2.64 \pm 0.36	0.87	0.70
16	42	I do nursing care by following standard nursing guidelines		0.87	
17	7	Our nursing unit uses an effective preceptor system		0.87	
18	40	I participate in decision-making related to nursing		0.87	
19	13	In our nursing unit, nurses care for the same patient if possible to ensure continuity of patient care		0.87	
20	12	I have time for activities, such as preparing hospital accreditation, attending conferences, and conducting research		0.88	
		Factor 4: Violence within ward (verbal or physical violence from co-workers and patients)			
21	36	I have experienced verbal and/or physical violence by employees of other departments in my current unit [†]	2.19 \pm 0.59	0.88	0.76
22	37	I have experienced verbal and/or physical violence by doctors in my current unit [†]		0.88	
23	35	I have experienced verbal and/or physical violence by peer nurses in my current unit [†]		0.88	
24	34	I have experienced verbal and/or physical violence by patients or family members in my present unit [†]		0.88	
		Factor 5: Sufficient inventory and supply (enough materials and machinery resources)			
25	3	Our nursing unit has enough medical equipment	2.45 \pm 0.55	0.87	0.70
26	4	Our nursing unit has enough medical materials		0.87	
27	6	Our nursing unit has enough computers for nursing care		0.87	

Table 3 Continued

		Factor items (definition)	Mean \pm SD	Cronbach's alpha if item deleted	Cronbach's alpha
		Factor 6. Hospital's support for working environment (consideration of employee welfare and safety)			
28	44	Our hospital has good facilities for nurses, such as a dormitory or lodging	2.55 \pm 0.48	0.87	0.69
29	46	Our hospital regards the safety of employees as very important		0.87	
30	45	Our hospital has a reporting system for injuries during work		0.87	
31	43	Our hospital provides administrative support for attendance and leaving, such as shuttle bus, and flexible work hours		0.87	
32	47	Our hospital uses a fair promotion system		0.87	
		Factor 7. Recognition and respect (sense of worthwhileness and happiness related to respectfulness)			
33	38	I am happy working in my current unit	2.76 \pm 0.46	0.87	0.71
34	39	I feel worthwhile working in my current unit		0.87	
35	30	In our nursing unit, peer nurses have a respectful attitude		0.87	
		Factor 8. Satisfaction with work schedule (satisfaction for scheduling)			
36	17	Our nursing unit has an easy policy for changing the duty schedule	2.69 \pm 0.50	0.87	0.63
37	16	Our unit accepts requests for personal duty schedule		0.87	
38	14	Our nursing unit provides enough off-duty and vacation time		0.87	
		Factor 9. Computer problems (trouble from the computer performance)			
39	5	Computer problems such as slower speed and malfunctioning occur while working in our unit [†]	2.96 \pm 0.73	0.88	
		Total	2.58 \pm 0.31	0.87	

[†]Reverse items.

application of the nursing process, and continuity of nursing. The area of outcome was not included in the assessment tool because it is an outcome index of the nursing work environment.

Additionally, the authors compared the conceptual basis of the authors' assessment tool to Lake's (2002) PES-NWI, which is a well-recognized tool supported by theoretical and empirical tests. Additional confirmation was conducted in the areas noted as insufficient, such as welfare, physical environment, professionalism of nursing work, and relationships with other occupations.

The verification process for content validity was conducted with two rounds of expert evaluation and a pilot survey. The items showing at least 80% agreement were selected. A factor analysis for the construct validity of the tool led us to extract a total of nine factors and 39 items. The total explanatory variance turned out to be 58.7%, which is similar to the 58.9% in the factor analysis of the PES-NWI (five factors and 31 items) conducted by De Pedro-Gómez *et al.* (2012).

Let us now examine each factor individually. The first factor, "manager leadership", had the highest explana-

tory variance, 23.6%. Manager leadership was assessed regarding nursing managers' behavior: their openness to the results of performance evaluations, supportiveness, playing a mediator role in conflicts between workers, openness to discuss problems, offering their management vision to the nurses, appraisal and recognition, and consistent stimulation of the nurses' development. Although it is named differently to other tools (Duddle & Boughton, 2008; Lake, 2002), manager leadership is commonly accepted as the most influential area of all work environment categories. Therefore, management leadership significantly affects the nursing work environment. In the PES-NWI, the category of "nursing manager's ability, leadership, and support of nurses" measures the support of managers, appraisal/recognition, and support for nurses in conflicts with doctors. However, the present authors' scale includes additional questions about constant stimulation for professional development and openness to discussing problems, which the authors added to assess managers' involvement in motivation and nurses' participation in decision-making processes.

The second factor, “supporting environment for nursing work”, included questions regarding the amount of walking required for nursing work, workforce, time and opportunity to discuss problems of patients with co-workers, meal time, salary, and criteria for performance evaluation. The PES-NWI (Lake, 2002), in contrast, includes the appropriateness of the workforce and resources to allow the nurses to spend time with patients, opportunity and time to discuss problems of nursing care with other nurses, and a sufficient workforce size. The current tool deals with more realistic workforce problems by including the sufficiency of meal time. Additionally, consideration of the amount the nurses must walk during work was added to address ward structure and workforce problems.

The third factor, “patient care environment and professional activities”, measured the utilization of the preceptor system, continuity of patient care, participation in decision-making about patient care, application of the nursing process, and nursing practice based on standardized nursing guidelines, and having activities for professional development such as preparing hospital accreditation, doing research, and ward conferences. The questions regarding continuity of patient nursing, participation in decision-making, application of the nursing process, and application of standardized guidelines are similar to those in the PES-NWI category “nursing foundations for quality of care”, which include questions about the preceptor program, the existence of a written, up-to-date nursing care plans, and patient care assignments that foster continuity of care. The authors included two additional items based on empirical experiences and published work reviews: (i) preparation for hospital accreditation; and (ii) having activities such as attending conferences and conducting research outside of compensated work time. These seem uniquely relevant to Korean culture. This factor was included in this tool to identify the effect of these activities on nurses.

The fourth factor, “violence within ward”, included questions regarding verbal and physical violence from patients, guardians, colleague nurses, doctors, or staff of other departments. The current tool is the first of its type that includes this area in assessing the nursing work environment. Violence is a common issue that workers providing interpersonal service in such fields as administration, education, and nursing must address. It is a common phenomenon nurses face in reality (Roche, Diers, Duffield, & Catling-Paull, 2010). Violence can occur in various forms, such as verbal, emotional, and physical. Nurses commonly experience

violence from patients, patients’ families, visitors, and co-workers, and the departments where nurses are most vulnerable are the emergency room, psychiatric ward, and residential homes for the elderly. A previous study on the violence committed against clinical nurses in Korea (Kim & Kim, 2004) reported that 93.7% of nurses experienced verbal violence and 23.4% experienced physical violence. The major violent offenders were in the order of guardians of patients, patients, doctors, supervisors, colleague nurses, and junior staff. The most frequent source of violence was patients’ family members. However, that study noted that only 29% of violence from patients is reported and that verbal violence in particular is seldom reported. Violence experienced by nurses decreases the quality of the nursing work environment and makes it more negative, which then reduces the outcomes of nursing care and ultimately worsens the job satisfaction of nurses. When nursing managers and organizations improperly or poorly handle this type of problem, nurses often fall into a feeling of helplessness (Chambers, 1998). Therefore, this study included questions regarding violence, which has not been included in other assessment tools. This result may have significance and provide insight for future research on the offenders and the degrees of violence in nursing work environments.

The fifth factor, “sufficient inventory and supply”, included questions to measure the sufficiency of medical equipment, materials, and computers. This area is not covered by the PES-NWI. The Agency for Healthcare Research and Quality (2004) advocates the inclusion of a hospital’s working conditions, including physical and human conditions, in the list of patient safety items in hospital environment inspections. The physical environment contains all the aspects of the environment, including working conditions other than wages, that allow workers to effectively carry out their responsibilities, for example, heating/cooling system, lighting, temperature, humidity, rest areas, dormitories, ward structure, working area, beds (Lusted, 1997), break time, and vacation days. The physical environment is directly related to the morale of nurses, work efficiency, job satisfaction, and absence rate (Song & Suh, 1998), and it affects the rate of work-related musculoskeletal disorders among nurses (Lusted, 1997). The physical environment can also help to minimize fatigue from work, maximize concentration on work, and consequently increase work efficiency. In the clinic, inefficiency occurs when intensive care unit inpatients or patients from other medical departments are admitted, especially during weekends or holidays, and thus nurses have to

search for or borrow supplies (Choi, Yang, & Baek, 2011). Thus, Choi *et al.* (2011) reported that supply- or equipment-related problems are one of the main non-value-added activities that are responsible for decreasing work efficiency. This item was added because its significance in affecting work efficiency due to insufficient inventory, especially of computers, is noticeable in the hospitals using electronic medical records throughout Korea.

The sixth factor, “hospital’s support for working environment”, was composed of five questions regarding administrative support for commuting (e.g. shuttle bus, flexible work hours), lodging for nurses, a regular report system in case of work injuries, emphasis on safety, and promotion structure. These items evaluate administrative support for nurses in the hospital based on the hygiene factors of motivation. Parsons *et al.* (2006) defined a healthy nursing work environment as working conditions that satisfy the basic needs of nurses, such as a low noise level, proper lighting, and a lounge area for breaks. The present tool departs from existing ones in that the authors subdivided the area of organizational support into three subcategories – hospital’s support for working environment, support for nursing environment, and support for patient care environment – with the hope that the authors could present a more detailed and specific analysis of the issue.

The seventh factor, “recognition and respect”, consisted of three questions about respect among colleague nurses, pleasure derived from work, and whether their work felt rewarding. Kreitzer *et al.* (1997) defined a healthy work environment as an environment where individuals look forward to reporting to work each day, individuals are well respected and are called by name, and their talent is recognized as an asset to the group. An accurate perception of the work environment is necessary to create this type of healthy work environment. Additionally, as reported by Alameddine, Dainty, Deber, and Sibbald (2009), personal satisfaction in work, the possibility to demonstrate their full potential, and autonomy are crucial factors in creating a healthy work environment. This category was included in the current assessment tool because it was clear that satisfaction and a sense of having a rewarding job are necessary elements to create a healthy working environment.

The eighth factor, “satisfaction with work schedule”, contained three questions regarding sufficient vacation and off-duty days, respect for personal work requests, and ease of changing the work schedule. According to an in-depth analysis of job turnover of clinical nurses by Lee and Kim (2008), the main aspects of an inappropriate

work environment, which led to job turnover, included an irregular work schedule and fatigue from working the night shift and then the day shift on the following day.

Finally, the ninth factor, “computer problems”, included one question on computer problems occurring during work hours (slower speed and malfunctioning). Breakdown of medical equipment delays nurses’ work. Computer problems, including malfunctioning and lagging speed, are key reasons for non-value-added activities (Choi *et al.*, 2011), because they waste nurses’ time that should be spent searching for information and implementing doctors’ prescriptions. The computer system is a part of the communication system (Parsons *et al.*, 2006). Any problem in the system leads to wasted time and decreased productivity and requires improvement of the system. Therefore, computer problems seemed to be a logical addition to the nursing work environment assessment tool.

In contrast to the PES-NWI, the authors did not include nurses’ participation in hospital affairs. This category could evaluate whether nurses have opportunities to participate in policy-making decisions, whether nurse managers have equal authority and rights to other senior management personnel, whether hospital administrators listen and respond to workers’ interests, and whether nurses participate in the hospital’s policy committees. The authors purposely excluded this category because it seemed inapplicable to the nursing work environment and nursing culture in Korea.

In the analysis of its reliability, the overall Cronbach’s alpha value was 0.87, and the values for individual factors ranged 0.63–0.86. These figures are higher than the 0.82 (range, 0.71–0.84) of the PES-NWI (Lake, 2002) and slightly lower than the 0.93 (range, 0.80–0.84) of the Korean version of the PES-NWI (Cho *et al.*, 2011). A Cronbach’s alpha value over 0.70 is considered reliable in exploratory research in general, which verifies the reliability of this research. To compute the score of the authors’ tool, they used the average of the items’ scores. The present assessment tool is based on a 4 point Likert scale, partly because the authors wanted to eliminate the possibility of convergence on middle scores when using a 5 point scale and because it is easy to compare the results with those from past analyses. Friesen *et al.* (2008) based the standard on 2.5 as a cut-off, declaring a good work environment score to be over 2.5 and a bad work environment score under 2.5. The authors calculated a total average score of 2.58, identical to that obtained with the Korean-translated PES-NWI by Cho *et al.* (2011). This perhaps indicates that

the current assessment tool well reflects the nursing work environment of Korean hospitals.

The significance of developing the current assessment tool lies in the authors' attempt to reflect the reality and nursing culture of domestic hospitals (in Korea) as much as possible. Additionally, by conducting surveys of nurses working in general hospitals from eight different provinces across the country, the present study is more representative of Korean nurses and hospitals than previous studies that were limited to Seoul and its metropolitan areas.

A few limitations should be considered when interpreting the results of this study. First, it did not reflect all the differences among hospitals in nursing work environment, hospital policies, nursing policies, patient characteristics, and severity of the patients' conditions. Second, it included nurses with more than a year's working experience. Therefore, discretion is needed for generalization.

CONCLUSION

An alternative tool to assess the nursing work environment in Korean hospitals with verified reliability and validity was created here. This tool includes 39 items in a 4 point Likert scale, broken down into nine categories. The explanatory power of this tool was shown to be appropriate, at 58.7%.

The main concepts of the nursing work environment in Korea have been defined through this research. These included "manager leadership", "supporting environment for nursing care", "patient care environment and professional activities", "violence within ward", "sufficient inventory and supply", "hospital's support for working environment", "recognition and respect", "satisfaction with work schedule", and "computer problems". These basic necessities must be supported in order to provide quality nursing work, and the tool includes the elements that nurses felt important to be included in the nursing work environment.

Further research must be conducted to verify the reliability and validity of this tool. Additionally, a slightly different tool should be developed that can assess nursing work environments in medium-sized hospitals. The authors hope that this tool can be applied to further research on patient results related to the nursing environment, evaluations of nursing quality, and evaluations of nursing productivity. Additionally, the authors naturally hope that this tool helps improve the nursing work environment in Korea.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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