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ORIGINAL ARTICLE

Core nursing competency assessment tool for graduates of outcome-based nursing education in South Korea: A validation study

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Abstract

Aim: To develop a competency assessment instrument for nurses who have completed an outcome-based educational program based on national standards and to assess the content-, construct-, and criterion-related validity of that instrument.

Methods: In the development stage, the competencies of nurses with 1–3 years' clinical experience after the completion of nursing education and training programs, based on national standards, were identified. A systematic literature review was conducted to derive the competencies in addition to the 12 national standard competencies. In the evaluation stage, the content-, construct-, and criterion-related validity of the developed tool were verified. For verification of the content validity at each stage, the participants were 10 nurse managers of general hospitals and 10 nurse professors. A factor analysis was conducted to assess the construct validity and the Cronbach's alpha coefficients and item-total correlation were used to assess the reliability of the developed scale. For the factor analysis, the participants were 141 nurses with 1–3 years' clinical experience who were recruited from four general hospitals. In order to evaluate the construct- and criterion-related validity, the correlations between a nursing performance measurement scale, a self-leadership tool, and the developed scale were examined.

Results: A competency assessment instrument, consisting of 19 items on a 4-point scale, was developed and validated for assessing the competencies among nurses with 1–3 years' experience.

Conclusions: Nursing research, policy awareness, and leadership competencies were required by the Korean Accreditation Board of Nursing Education for nursing college graduates, but were removed due to poor content validity, indicating a need for nursing professionals to bridge the gap between educational standards in nursing colleges and clinical settings.

Key words: advanced beginner nurses, competency, nursing graduates, outcome-based education.

INTRODUCTION

The move to outcome-based education has been one of the most important recent trends in health profession education (Davis, 2003). Outcome-based education is worth implementing because it can help to close the gap between education and the ever-changing work environment (Fan, Wang, Chao, Jane, & Hsu, 2014). In outcome-based education, the curriculum scope extends beyond core competencies to the knowledge, attitudes, and skills comprising professional nursing. Curricula are not standardized, but the model aims for standardized outcomes (Sroczynski, 2015).

The meanings of "competency" vary and include the ability to successfully carry out an occupation or to reason or make decisions in specific circumstances

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(Spencer & Spencer, 1993). Competency model development relies on finding an appropriate theory. Clinical competency assessment is crucial for educators and administrators (Wu, Enskär, Lee, & Wang, 2015). In order to identify competencies, it is necessary to establish standards in advance and to investigate the characteristics of competent individuals (Spencer & Spencer). Professions generally require specialized behavioral patterns for successful outcomes. An analysis of these behavioral patterns could identify the core competencies that are required of nurses. A competency can be defined as an expected level of performance that integrates knowledge, skills, abilities, and judgments (American Nurses Association, 2013). By extension, "core" competencies refer to the essential competencies that a registered nurse is expected to possess at entry into practice—and is therefore an outcome of his or her nursing education—in order to provide the public with safe, effective, and ethical care (The Nursing Council of Hong Kong, 2012).

In South Korea, the Korean Accreditation Board of Nursing Education (KABONE) since 2010 has established compulsory outcome-based standards of education and training so that nursing students can receive a quality-assured education. Therefore, educational objectives must be identified and be complemented by the core competencies that are expected of new graduate nurses in clinical settings (Park & Hwang, 2013). In particular, KABONE (2012) recently established 12 program outcome standards for evaluating student competencies at the end of the academic year. In 2000, KABONE was established to help create competent nurses and to improve nursing education as a whole (KABONE, 2016). Although KABONE initially was directly supervised by the Korean Nurses Association, it is now a specialized institution under the supervision of the Ministry of Health and Welfare. It is involved in accrediting 4 year nursing programs, in particular ensuring that these programs provide quality education and meet all the requirements of curriculum maintenance. Since 2010, the process of accrediting nursing programs has become mandatory and much more formalized, compared to at its beginning (Kang & Kim, 2016).

Background

South Korea's nursing education system has been evolving within a rapidly changing socioeconomic environment since the 2000s, which parallels the ongoing transformation of higher education. There was once a shortage of nursing staff and students; now, the number of graduates has increased from 11,053 in 2000 to >20,000 in 2015 and the number of nursing education institutions has increased by 200. Many Korean hospitals experienced a nurse shortage until the government established new schools and increased the number of nursing students, beginning in 2009. After this expansion, KABONE developed a nursing education accreditation system to ensure that the graduates could manage the social responsibilities of nursing.

The nursing education accreditation system certifies qualitative growth and educational achievements among training institutions, including quality curricula, environments, and outcomes, against a national standard that is necessary to meet society's needs (KABONE, 2014). The nursing education accreditation system signifies three achievements: program graduates exhibit abilities and qualities that are consistent with the established learning outcomes of the institution; the institution meets the minimum requirements of quality nursing education with regard to the nursing education administration; and the accredited institution strives for continuous improvement in nursing education quality (KABONE, 2012). The graduates of unaccredited Korean universities will not be allowed to take the licensing exam beginning in 2018; thus, universities have sought accreditation and, as of August, 2015, 104 of the 200 programs (including Baccalaureate) have been accredited. However, although nursing programs modified their curricula to established graduation outcomes or competency standards for accreditation, few studies have examined the assessment of graduate competencies according to standardized outcomes. Workplace competencies can be developed, based on the abilities of nurses with 2–3 years' experience in identical positions or similar situations (Bob, 2009). The Standards for Clinical Nursing Education (Singapore Nursing Board, 2012a,b) states that a nurse is qualified as a preceptor if he or she has a minimum of 3 years' clinical experience; therefore, assessing competencies within 3 years of graduation is appropriate for evaluating outcome-based educational programs. Nurses are divided into five levels of clinical experience (novice, advanced beginner, competent, proficient, expert), guided by Benner's (1984) criteria. The expected level of competency at <3 years' experience is consistent with that of the advanced beginner.

Currently, because a large number of Korean nursing schools are being evaluated according to KABONE's standards, it is necessary to assess the competencies among experienced nurses who have completed

outcome-based educational programs, even if this is not an area of evaluation now. At present, student competencies related to outcome-based education are assessed only at the end of the academic year. Each university has changed their outcome-based curricula since 2012 and the graduates who have completed the new outcome-based programs will have been produced by 2017.

Many Korean nursing school programs have long attempted to change their curricula to measure student competencies in a variety of ways. The development of this tool is needed to assess the competencies among experienced nurses who have completed outcome-based educational programs, not for students' competencies at the end of the academic year.

Therefore, now is the time to establish competency standards for early-career nurses (e.g. those with 1–3 years of experience) who would be completing the KABONE (2012)-compliant standardized outcome-based educational programs in 2017 and onward.

METHODS

This study comprised development and evaluation stages. In the development stage, the competencies of nurses with 1–3 years' clinical experience who completed a KABONE (2012)-compliant standardized outcome-based educational program were derived. In this study, the standardized outcomes refer to the expected competencies. In the evaluation stage, the reliability, as well as the construct-, criterion-, content-, and convergent-related validity, of the developed nursing core competency assessment tool was verified.

Aim

This study aimed to develop and evaluate a competency assessment tool for nurse graduates of KABONE-compliant standardized outcome-based educational programs with 1–3 years' clinical experience in Korea (Fig. 1).

Data collection

A systematic literature review of four electronic databases (PubMed, CINAHL, KoreaMed, and RISS) was conducted in order to extract the competencies of experienced nurses. A systematic search strategy included keyword terms and related text words, including "nursing competency," "clinical competency," "nursing practical competency," and "nursing skill." Documents created over the last two decades were reviewed by applying the PIO method (Moyer, 2008)—where "P" stands for *population*, "I" for *intervention of interest*, and "O" for *outcome*—to the abstract (Mlenzana, Frantz, Rhoda, & Eide, 2013). The PIO method was used to select articles that were relevant to this study. In the systematic review, the first step is to state a research question for the PIO process. The research question of this study was "What are the nursing competencies that are necessary for experienced nurses?" For a systematic review based on the PIO process in this study, P was "advanced beginner nurses," I was "not applicable," and O was "nursing competency." For further clarification, in the use of the PICO strategy (Cooke, Smith, & Booth, 2012), C was "Comparing outcomes-based education to other programs." The inclusion criteria were as follows: (i) peer-reviewed research; (ii) published from January, 2005 to June, 2015; (iii) using experimental, cohort, survey, or qualitative designs; (iv) written in English or Korean; and (v) an examination of clinical competency assessment for experienced nurses. If the articles did not meet these criteria, they were excluded from the study. The exclusion criteria were: (i) editorials, opinion pieces, or conference abstracts; (ii) review papers; (iii) non-English or non-Korean language papers; and (iv) examinations of specific nursing competencies in specific clinical settings. The data collection period was from July 8 to 14, 2015.

Based on the systematic review, a matrix of competencies was created. The extracted competencies were examined for their content validity by 10 nurse managers with >10 years' experience and assessment items were drafted. These items then were examined for their content validity by 10 nursing professors in outcome-based nursing education institutions. The content validity is calculated by using the content validity index (CVI). The experts (10 nurse managers) scored the items based on their relevance, clarity, and comprehensiveness by using a rating scale of 1 ("none") to 4 ("high levels of relevance, clarity, and comprehensiveness"). Next, the CVI was calculated by considering the ratio of scores of three or four for all the items. If the ratio was >0.8, the item was deemed to have a high content validity (Hair, Black, Babin, & Anderson, 2010).

In order to evaluate the construct validity and reliability of the instrument, a factor analysis was conducted on the developed nursing core competency assessment tool with a sample of 150 nurses with 1–3 years' clinical experience. Convergent validity refers to the degree to which two measures of constructs that theoretically should be related are in fact related (Kang, 2013). In this study, it was evaluated by examining the

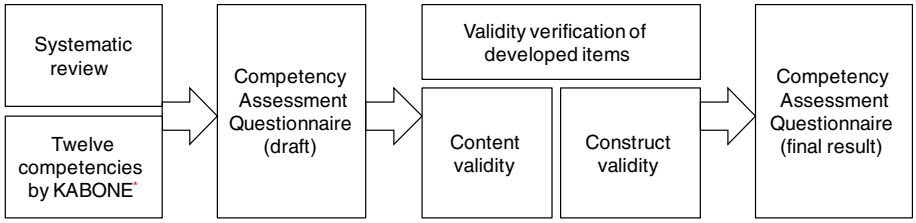

Figure 1 Study process. KABONE, Korean Accreditation Board of Nursing Education.

correlations between a nursing performance measurement (Ko, Lee, & Lim, 2007) and the nursing core competency assessment tool. To establish the criterion-related validity, or the degree to which an instrument is correlated with a given outcome (Kang), the correlations between a self-leadership measurement (Kim, 2005) and the nursing core competency assessment tool were examined. Self-leadership and the nursing competency level have been found to be related in prior studies (Han & Park, 2013; Kim; Lee & Yom, 2015; Seomun, Chang, Cho, Kim, & Lee, 2006), which is why a self-leadership scale was chosen to confirm the criterion-related validity of the nursing core competency assessment tool.

Sampling

The participants were nurses with 1–3 years' clinical experience, recruited from four general hospitals in Seoul and Jeolla-do, South Korea. A sample of 150 was chosen to meet the condition that the sample exceed fivefold the number of questionnaire items (21) for reliability and validity assessment (Tabachnick & Fidell, 1996). In total, 141 of the 150 (94%) questionnaires were returned.

Measures

To evaluate the construct- and criterion-related validity of the nursing core competency assessment tool, the correlations between a nursing performance measurement scale, a self-leadership tool, and the nursing core competency assessment tool were examined. The nursing performance measurement scale (Ko, Lee, & Lim, 2007) consisted of 17 items on four factors, including competency, attitude, willingness to improve, and application of the nursing process. A higher score indicates better nursing work performance. The self-leadership tool in this study consists of 18 items that had been developed by Manz and Sims Jr. (2001) and revised by Kim (2002). The subscales included self-expectations, rehearsal, self-goal setting, self-compensating, self-criticism, and constructive thinking. The participants rated their level of agreement with each statement on a 5-point Likert scale ("strongly agree" = 1, "strongly disagree" = 5). A higher score indicates greater self-leadership. The Cronbach's alpha was 0.84 in this study.

Analysis

The Statistical Package for Social Sciences v. 21 (IBM Corporation, Armonk, NY, USA) was used for the data analysis. Descriptive statistics were computed to examine the participants' characteristics. The Cronbach's alpha coefficients were used to assess the internal consistency reliability and item-total correlation and an exploratory factor analysis with varimax rotation was carried out to assess the construct validity. An exploratory factor analysis, rather than a confirmatory factor analysis, was used because the subareas of the developed tool's factor structure have not yet been established (Coates, 2002) and the factor structure has not been previously explored (Tigges, 2009). A principal component analysis (PCA) with varimax rotation was used to determine the factor solution. Pearson's correlation coefficients were used to assess the convergent- and criterion-related validity.

Ethical issues

The procedures were approved by the institutional review board (WKU IRB 201508–044) at Wonkwang University, Iksan, South Korea. All the information was handled anonymously and confidentially and was never used for any other purpose. The goal of the study was explained to the study's participants, the fact that they were free to withdraw from the study at any stage, and that they would not be at a disadvantage if they did not participate in the study. The study was begun after receiving informed consent for participation.

RESULTS

Systematic review

The questions that were used to conduct the review, developed using the PICO (Cooke, Smith, & Booth, 2012),

read as follows: "Does this article study the competencies of experienced nurses?," "Are the issues and concerns of this study related to the competencies of nurses?," and "Is there a clear statement of the findings with regard to nursing competency?" Each question was rated on a 4-point Likert scale ("strongly agree" = 4, "strongly disagree" = 1). The abstracts and titles were screened by two reviewers using this PICO strategy. Once the appropriate articles were selected, the full texts were obtained. After the removal of duplicates, the titles and abstracts of the remaining 1109 records were assessed for relevance. Subsequently, 347 full-text records were retrieved. Only 38 of these studies met the inclusion criteria. The sampling and evaluation process is illustrated in Figure 2. The papers were included if both reviewers agreed on their inclusion. If the two reviewers disagreed, a third reviewer was invited to appraise the paper.

The essential competencies for the nursing program graduates that were suggested by KABONE (2012), along with the competencies that had been derived from the 38 reviewed studies, are listed as a matrix in Table 1. There were 50 competencies that were identified in total, of which three were deleted due to overlapping concepts, for a final total of 47.

Content validity of the identified competencies

The 10 nursing managers who were participating in the survey to verify the competency content validity were all women at the average age of 45 years, with most being 40–45. Graduate degrees were held by nine of them. Half of the participants had worked on the general ward; the participants had worked as nurses for 22 years, on average, and as nursing managers for 8.5 years. The CVI is shown in Table 2. The total questionnaire CVI was >0.8 (0.89), but nine of the 47 competencies had CVIs of <0.8.

Content validity of the questionnaire items

The 38 competencies with a CVI of >0.8 were used as a basis to develop a questionnaire that contained 21 items for evaluating the capabilities of nurses with 1–3 years' experience. A second survey to verify the content validity was conducted with 10 nursing professors who had operated outcome-based nursing education programs (Table 3). The nursing professors were all women at the average age of 46.3 years; most were 40–45, with a doctorate. The total questionnaire CVI was >0.8 (0.98) and no item CVI was <0.8 (Table 3). Items 4 and 10 were modified to reflect suggestions for revision.

Construct validity

A survey that targeted the 150 nurses with 2–3 years of experience was conducted in order to verify the construct validity of the questionnaire. The assessed characteristics of the respondents included their sex, age, marital status, academic background, level of education, nursing department, and work experience. Women

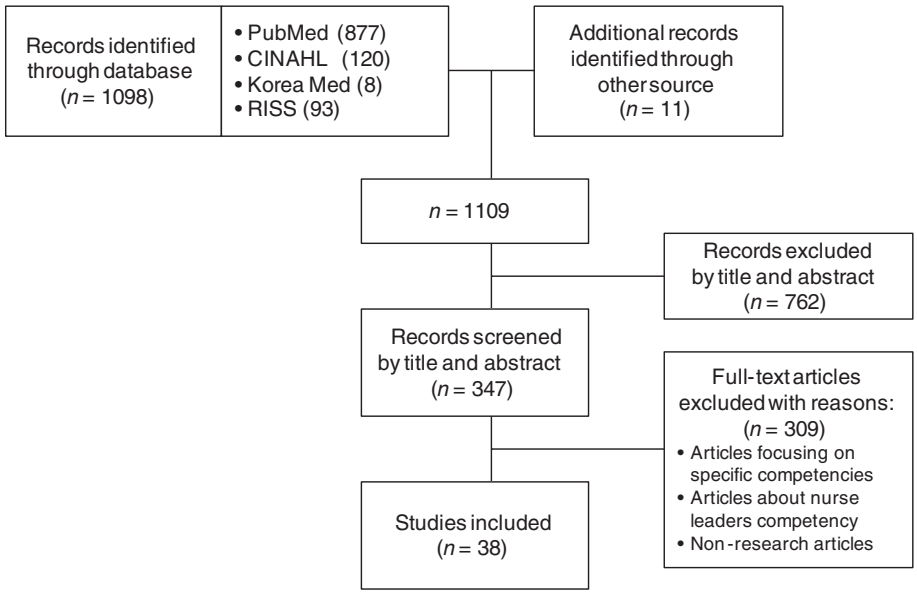

Figure 2 Systematic review flow diagram.

Table 1 Competency matrix

Competencies/included papers (article No.)	1	3	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
K Nursing knowledge	•		•	•					•			•							•			•	•													•
A Nursing skill performance	•								•				•				•	•						•	•		•				•					•
B Communication	•	•				•		•	•	•		•	•	•	•				•		•	•									•					
O Collaboration	•	•						•							•		•				•					•		•		•		•				
Teamwork										•				•			•															•				
N Critical thinking	•		•	•	•	•						•			•				•			•		•	•			•		•				•	
(2 Understanding nursing professional standards			•	•																					•	•		•								
(1 Understanding legal and ethical standards	•	•		•	•					•				•	•			•					•	•	•	•	•	•	•	•	•				
1 Comparative analysis of nursing leadership principles																																				
Provide leadership		•		•		•						•					•		•	•	•	•			•				•		•			•	
2) Nursing research		•		•										•						•					•										•
Policy awareness																			•																	
																											•									
1 Reflective thinking, clinical reasoning													•																							
2 Computer skills, informatic knowledge, information skills																											•				•					
3 Problem-solving			•														•																			
3 Decision-making and troubleshooting									•								•																			
3 Risk management																												•	•							
3 Patient safety																					•				•							•				
5 Interpersonal relationships					•							•				•		•	•			•	•	•	•				•		•		•			•
5 Teaching–coaching																																				
6 Helping																•																				
6 Ensuring quality																•					•											•	•			
7 Organization, controlling									•									•					•													
7 Stress management																																				
8 Cultural competency							•				•																									
10 Assessment												•		•	•				•	•	•	•														
10 Diversity																					•															

Table 1 Continued

Competencies/included papers (article No.)	1	3	4	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	22	23	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
10 Planning															•			•		•																
10 Family education																																				
15 Attentiveness																																				
16 Health promotion																																				
16 Personal and professional development																				•	•		•					•	•	•	•		•	•	•	•
18 Therapeutic interventions																			•	•		•														
20 Self-management, ego strength																			•							•	•	•		•						
22 Cognitive ability																																				
22 Social participation																																				
25 Holistic approach																																				
28 Efficient management of ward tasks				•	•	•						•		•	•	•	•			•	•					•	•	•	•							
28 Clinical judgment and subsequent coping																														•						
28 Patient-centered care																												•	•	•						
28 Flexibility and openness																											•	•		•						
28 Inclination toward patient care																																				
28 Self-confidence																												•		•						
28 Influence with staff																												•		•						
28 Resource management																												•	•	•						
28 Education and training of others																														•						
29 Initiative																											•									
29 Patient care and educational competency																												•								
31 Nursing process			•			•												•																		
34 Evidence-based practice																																				

Table 2 Competency content validity indices (CVIs)

Competency	CVI
1. Nursing knowledge	1.00
2. Nursing research	0.50
3. Policy awareness	0.60
4. Skill performance	1.00
5. Evidence-based practice	1.00
6. Communication	1.00
7. Nursing process	1.00
8. Holistic approach	0.90
9. Family education	1.00
10. Health promotion	0.80
11. Therapeutic interventions	1.00
12. Assessment	1.00
13. Patient-centered care	1.00
14. Inclination toward patient care	1.00
15. Patient care and education	1.00
16. Computer skills, informatic knowledge, information skills	1.00
17. Critical thinking	1.00
18. Cognitive ability	1.00
19. Self-confidence	1.00
20. Self-management, ego strength	1.00
21. Flexibility and openness	1.00
22. Efficient management of ward tasks	1.00
23. Clinical judgments and subsequent coping	1.00
24. Collaboration	1.00
25. Teamwork	0.90
26. Personal and professional development	0.80
27. Legal and ethical standards	1.00
28. Leadership	0.70
29. Influence with staff	0.60
30. Resource management	0.90
31. Education and training of others	0.70
32. Interpersonal relationships	1.00
33. Teaching–coaching, helping	0.70
34. Initiative	0.80
35. Attentiveness	1.00
36. Reflective thinking, clinical reasoning	1.00
37. Planning	0.70
38. Problem-solving	0.90
39. Decision-making and troubleshooting	0.80
40. Risk management	0.90
41. Patient safety	1.00
42. Ensuring quality	1.00
43. Organization, controlling	0.60
44. Stress management	0.90
45. Cultural competency	0.90
46. Diversity	0.90
47. Social participation	0.50
Total CVI	0.89

accounted for 97.9% of the respondents and 96.5% (136) were single; in total, 70.2% were graduates of 4 year nursing program colleges or the nursing department at 4 year colleges. Approximately 33.3% had worked in a special unit, 27.7% on a surgical ward, and 25.5% on a medical ward, with an average of 21.92 ± 6.75 months of work experience.

Bartlett's test of sphericity was used to verify the validity of an exploratory factor analysis of the preliminary questionnaire. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy value was 0.849 and Bartlett's test of sphericity was 0.000. As the KMO was >0.05, the preliminary tool was deemed to be suitable for a factor analysis. Item 18 ("I solve problems through proper decision-making") was removed because its communality value was <0.5 (0.356).

A factor analysis was conducted in order to verify the questionnaire's construct validity. First, the Measure of Sampling Adequacy (MSA) test was used to assess the adequacy of the sample. The MSA values for each item were >0.90, indicating an adequate sample size (Yeo, 2000).

A PCA with varimax rotation was used to extract the factors of the scale (Lee & Kim, 2002). Correlations among the items were 0.4–0.5, indicating that the factors were mutually uncorrelated. The scree plot revealed a practically flat incline after the fourth Eigenvalue on the scree plot. Both the Akaike information criterion and Schwarz–Bayes criterion were used to identify the model.

In the first factor analysis, an item ("I know the legal and ethical standards with regard to nursing care and reflect them in my nursing activity) was removed due to cross-loading. The factor analysis then was conducted again on the 19 items. Model selection indices supported a four-factor solution.

In conclusion, there were 50 identified competencies in total, of which three were deleted due to overlapping concepts. A further nine of the remaining 47 competencies were removed because they had CVIs of <0.8. With the 38 remaining competencies, the researchers developed a questionnaire that contained 21 items. A second survey was conducted in order to verify the content validity of this 21 item questionnaire, using 10 nursing professors. Two items were removed because of a communality of <0.5 (item 18) or because it showed a cross-loading in the factor analysis (item 13).

The results of the PCA on the core nursing competencies among the nurses with 1–3 years of clinical

Table 3 Competency assessment items

Competency	Items for the competency assessment	CVI
1. Nursing knowledge	1. I have nursing knowledge and use it for my nursing activities	1.00
2. Skill performance 3. Evidence-based practice	2. I recognize the importance of evidence-based practice and apply it to nursing skill performance	1.00
4. Communication 5. Holistic approach 6. Health promotion 7. Therapeutic interventions	3. I use the skills of therapeutic interventions and communication through a holistic approach for the purpose of the health promotion of patients	1.00
8. Assessment 9. Patient-centered care 10. Inclination of patient care	4. I focus on patients to care for and understand them → I offer patient-centered care and assessment	0.80
11. Family education 12. Patient care and education	5. I provide education for patients and their families	1.00
13. Computer skills, informatic knowledge, information skills	6. I collect a variety of information on nursing activities and make good use of computer skills	1.00
14. Nursing process 15. Critical thinking 16. Cognitive ability 17. Clinical judgment and subsequent coping	7. I apply appropriate nursing processes, depending on the patients' status and circumstances surrounding them 8. I make clinical judgments and subsequent coping strategies based on critical thinking and cognitive ability	1.00
18. Self-confidence 19. Self-management, ego strength 20. Flexibility and openness	9. I have self-management abilities, flexibility, and self-confidence	1.00
21. Efficient management of ward tasks	10. I carry out efficient management of diverse ward tasks that are assigned to me → I carry out efficient management of ward tasks that are assigned to me	1.00
22. Collaboration 23. Teamwork	11. I recognize the importance of teamwork and collaboration for nursing care among healthcare teams and adjust tasks effectively	1.00
24. Personal and professional development	12. I make consistent efforts for personal and professional development	1.00
25. Legal and ethical standards	13. I know the legal and ethical standards with regard to nursing care and reflect them in my nursing activities	1.00
26. Interpersonal relationships 27. Initiative 28. Stress management	14. I manage interpersonal relationships and stress on the basis of initiative	1.00
29. Attentiveness 30. Reflective thinking, clinical reasoning	15. I perform my nursing activities through attentiveness and reflective thinking	1.00
31. Resource management	16. I effectively manage diverse resources for nursing care	1.00
32. Problem-solving	17. I have risk management abilities related to nursing practice	1.00
33. Decision-making and troubleshooting 34. Risk management	18. I solve problems through proper decision-making	
35. Patient safety	19. I effectively deal with patient safety during nursing practice	1.00
36. Ensuring quality	20. I effectively deal with ensuring quality during nursing practice	
37. Cultural competency 38. Diversity	21. I care for patients based on cultural competency and diversity	1.00
Total CVI		0.98

CVI, content validity index.

experience are presented in Table 4. The Eigenvalues of the extracted factors were >1.0 and the factor loadings of all the items were high (>0.5). Regarding the factor composition, Factor 1 contained five items, Factor 2 contained six items, Factor 3 contained three items, and Factor 4 contained five items.

Table 4 Result of the factor analysis

Factor	Item	Item content for each factor	Factor loadings			
			Factor 1	Factor 2	Factor 3	Factor 4
1 Critical thinking and application of the nursing process	A7	I apply appropriate nursing processes, depending on patients' status and circumstances surrounding them	0.710	0.099	0.338	0.068
	A8	I make clinical judgments and subsequent coping strategies based on critical thinking and cognitive ability	0.638	0.314	0.216	0.001
	A6	I collect a variety of information on nursing activities and make good use of computer skills	0.620	0.121	0.373	0.218
	A12	I make consistent efforts for personal and professional development	0.601	0.098	−0.009	0.139
	A15	I carry out my nursing activities through attentiveness and reflective thinking	0.503	0.224	0.139	0.275
2 Self-management, coordination, and collaboration	A17	I have risk management abilities related to nursing practice	0.116	0.670	0.260	−0.130
	A9	I have self-management abilities, flexibility, and self-confidence	0.160	0.665	−0.006	0.088
	A10	I carry out efficient management of ward tasks assigned to me	0.097	0.602	0.354	0.220
	A11	I recognize the importance of teamwork and collaboration for nursing care among healthcare teams and adjust tasks effectively	0.150	0.556	0.378	0.307
	A14	I manage interpersonal relationships and stress on the basis of initiative	0.297	0.549	−0.300	0.246
	A16	I effectively manage diverse resources for nursing care	0.276	0.434	0.228	0.423
3 Patient care	A1	I have nursing knowledge and use it for my nursing activities	0.227	0.244	0.792	−0.020
	A2	I recognize the importance of evidence-based practice and apply it to nursing skill performance	0.353	0.117	0.719	0.129
	A4	I offer patient-centered care and assessment	0.181	0.020	0.468	0.196
4 Ensuring quality and communication	A5	I provide education for patients and their families	0.330	−0.202	0.046	0.722
	A21	I care for patients based on cultural competency and diversity	0.393	.204	0.018	0.589
	A3	I use skills of therapeutic interventions and communication through a holistic approach for the purpose of the health promotion of patients	−0.063	0.280	0.363	0.563
	A20	I effectively deal with ensuring quality during nursing practice	0.295	0.380	0.025	0.560
	A19	I effectively deal with patient safety during nursing practice	−0.142	0.107	0.473	0.547
Eigenvalue			6.130	1.470	1.400	1.290
Variance			32.260	7.730	7.340	6.770
Cumulative variance			32.260	39.990	47.340	54.110

Extraction method was principle component analysis with varimax rotation.

Considering that a higher factor loading represents a better explanation of the factor (Waltz & Bausell, 1981), the variables were reviewed in order of the highest loading values and the underlying meaning of all the other variables was taken into account when naming a factor. In Factor 1, the following items demonstrated the highest factor loading values: "I apply appropriate nursing processes, depending on patients' status and circumstances surrounding them," "I make clinical judgments and subsequent coping strategies based on critical thinking and cognitive ability," "I collect a variety of information on nursing activities and make good use of computer skills," "I make consistent efforts for personal and professional development," and "I carry

out my nursing activities through attentiveness and reflective thinking." Reflecting the essence of the underlying relationship among the specific competencies that had been identified in the literature, including the application of the nursing process, critical thinking, cognitive ability, clinical judgment and subsequent coping, and professional development and reflective thinking, Factor 1 was named "Critical thinking and the application of the nursing process."

In Factor 2, the following items demonstrated the highest factor loading values: "I have risk management abilities related to nursing practice," "I have self-management abilities, flexibility, and self-confidence," "I carry out efficient management of ward tasks assigned to me," "I recognize the importance of teamwork and collaboration for nursing care among healthcare teams and adjust tasks effectively," "I manage interpersonal relationships and stress on the basis of initiative," and "I effectively manage diverse resources for nursing care." Reflecting the essence of the underlying relationship among the specific competencies that had been identified in the literature, including self-confidence, self-management, flexibility, collaboration, teamwork coordination, initiative, stress management, and resource management, Factor 2 was named "Self-management, coordination, and collaboration."

In Factor 3, the following three items demonstrated the highest factor loading values: "I have nursing knowledge and use it for my nursing activities," "I recognize the importance of evidence-based practice and apply it to nursing skill performance," and "I offer patient-centered care and assessment." Reflecting the essence of the underlying relationship among the specific competencies that had been identified in the literature, including nursing knowledge, skill performance, evidence-based practice, assessment, patient-centered care, and an inclination toward patient care, Factor 3 was named "Patient care."

In Factor 4, the following items demonstrated the highest factor loading values: "I provide education for patients and their family," "I care for patients based on cultural competency and diversity," "I use skills of therapeutic interventions and communication through a holistic approach for the purpose of the health promotion of patients," "I effectively deal with ensuring quality during nursing practice," and "I effectively deal with patient safety during nursing practice." Reflecting the essence of the underlying relationship among the specific competencies that had been identified in the literature, including family education, patient care and education, communication, health promotion, therapeutic interventions, patient safety, and ensuring quality, Factor 4 was named "Ensuring quality and communication."

Internal consistency reliability

Table 5 shows the item-total correlations (r) between the factors, which ranged from 0.3 to 0.5, with the highest value being 0.614 ($P < 0.001$). This indicated that the instrument had internal consistency reliability. This was illustrated further by the Cronbach's alpha of the competency assessment tool (total alpha coefficient = 0.87) and every item. Table 5 also presents the item-total correlations and whether the removal of any item lowered the internal consistency reliability of the scale.

Convergent and criterion-related validity

In order to evaluate the convergent validity, the calculated correlation coefficients between the scale and selected measures should be at least 0.40 to be considered as acceptable (Ware, Snow, Kosinski, & Gandek, 1993). The correlation between the developed competency assessment tool and the nursing performance measurement scale was 0.78. To evaluate the criterion-related validity, the correlation between the developed competency assessment tool and the self-leadership scale was calculated, which was 0.47 (Table 6).

Following validity and reliability analyses, the assessment tool was finalized. The final scale consists of 19 items that are scored on a 4-point scale. The theoretical scores range from 19 to 76, with higher scores indicating greater nursing competency.

DISCUSSION

Lee, Park, and Jeong (2012) identified therapeutic care, professionalism, administrative abilities, a humanistic approach, relational abilities, and personality as the core competencies that are required of nursing graduates and that are necessary for practice. Utley-Smith (2004) identified health promotion, management and supervision, communication, direct nursing activities, computer skills, and partnership and collaboration as graduate competencies. When comparing these past findings with the results of this study, a number of common competencies can be highlighted: communication, health promotion, therapeutic interventions, computer skills, management, collaboration, relationships, professionalism, and skill performance, in particular, for direct nursing activities. However, some of the

Table 5 Internal reliability of the questionnaire

Item	Corrected item-total correlation	Alpha if item deleted
1. I have nursing knowledge and use it for my nursing activities	0.516	0.865
2. I recognize the importance of evidence-based practice and apply it to nursing skill performance	0.559	0.863
3. I use skills of therapeutic interventions and communication through a holistic approach for the purpose of the health promotion of patients	0.470	0.866
4. I offer patient-centered care and assessment	0.361	0.869
5. I provide education for patients and their family	0.369	0.870
6. I collect a variety of information on nursing activities and make good use of computer skills	0.600	0.860
7. I apply appropriate nursing processes. depending on patients' status and circumstances surrounding them	0.551	0.862
8. I make clinical judgments and subsequent coping strategies based on critical thinking and cognitive ability	0.540	0.863
9. I have self-management abilities, flexibility, and self-confidence	0.407	0.869
10. I carry out efficient management of ward tasks assigned to me	0.556	0.862
11. I recognize the importance of teamwork and collaboration for nursing care among healthcare teams and adjust tasks effectively	0.612	0.860
12. I make consistent efforts for personal and professional development	0.377	0.869
14. I manage interpersonal relationships and stress on the basis of initiative	0.372	0.872
15. I carry out my nursing activities through attentiveness and reflective thinking	0.519	0.864
16. I effectively manage diverse resources for nursing care	0.614	0.861
17. I have risk management abilities related to nursing practice	0.388	0.868
19. I effectively deal with patient safety during nursing practice	0.376	0.868
20. I effectively deal with ensuring quality during nursing practice	0.574	0.862
21. I care for patients based on cultural competency and diversity	0.540	0.862

competencies were unique to this study, such as evidence-based practice, family education, patient care and education, critical thinking, clinical judgment and subsequent coping, self-confidence, and cultural competency. The differences can be attributed to the fact that it was sought to derive more detailed competencies because of the aim to develop a competency assessment tool, rather than for other study purposes.

KABONE (2012) proposed competencies in knowledge and expertise in holistic nursing, integrated application of nursing skills, communication and collaboration between specialized fields for the health promotion of patients, critical thinking for solving nursing problems, legal and ethical responsibility for the development of professional nursing, leadership for nursing goal attainment, research skills for the scientific development of nursing practice, and a response to change in global healthcare policies. As noted, there exist many studies of competencies of 4 year nursing college graduates, but few examining competencies among nurses with 2–3 years' experience ("advanced beginner" and "competent," as defined by Benner, 1984).

Many studies address only general competencies, regardless of work experience (Decker, Utterback, Thomas, Mitchell, & Sportsman, 2011; Liu, Yin, Ma, Lo, & Zeng, 2009; Safadi, Jaradeh, Bandak, & Froelicher, 2010). In this study, both novice nurses and competent nurses were excluded because new nurses (i.e. those with <1 year of experience) are not believed to have fully developed their competencies, whereas the competencies of nurses with >3 years of experience are generally considered to be influenced more by nurses' personal situations, such as education and experience since graduation, as opposed to the educational program in their nursing school. According to Randolph *et al.* (2012), nurses with 1–3 years' experience performed significantly better than did nurses with <1 year of experience on six of the nine categories: attentiveness, clinical reasoning (noticing), clinical reasoning (understanding), communication, procedural competency, and documentation. The authors additionally concluded that these competencies are those that are required of nurses with 1–3 years' experience. According to Unhasuta, Robinson, and Magilvy (2010), trauma core competency depends on work experience: while nurses with

Table 6 Factor intercorrelations and correlations with competency, nursing performance, and self-leadership

	Factor 1	Factor 2	Factor 3	Factor 4	Competency	Nursing performance	Self-leadership
Factor 1	1.000						
Factor 2	0.543	1.000					
	0.000						
Factor 3	0.534	0.422	1.000				
	0.000	0.000					
Factor 4	0.525	0.504	0.433	1.000			
	0.000	0.000	0.000				
Competency	0.832	0.836	0.673	0.782	1.000		
	0.000	0.000	0.000	0.000			
Nursing performance	0.650	0.657	0.549	0.598	0.783	1.000	
	0.000	0.000	0.000	0.000	0.000		
Self-leadership	0.384	0.407	0.328	0.358	0.472	0.549	1.000
	0.000	0.000	0.000	0.000	0.000	0.000	

1–3 years' experience follow standard protocols, nurses with 3–5 years' experience must be able to apply protocols while considering the patient's status, suggesting that the ability to respond differs according to work experience. Of course, the work by Unhasuta, Robinson, & Magilvy differs in purpose from the present study, as the former focuses on trauma care. In this study, "I apply appropriate nursing processes, depending on patients' status and circumstances surrounding them" was indeed included as an item to assess competency.

Clinton, Murrells, and Robinson (2005) indicated that competencies, such as leadership, are stable over time. In this study, leadership skills, as suggested by KABONE (2012), were presented as a core competency, but it was removed because of poor content validity. This suggests that leadership skills are not considered to be essential for nurses with <3 years of experience at Korean hospitals and is not prioritized because adaptability is more important in an environment where many new nurses leave the hospital before long.

McLean, Monger, and Lally (2005) classified six competencies—personal and people development; health, safety, and security; service development; quality; and equality, diversity, and rights—as core competencies and four competencies—assessment of health and well-being needs; addressing individuals' health and well-being needs; partnership; and leadership—as specific competencies. McLean *et al*. also did not categorize leadership skills as a core competency.

It is possible to compare the study's results concerning the developing competencies of nurses who completed outcome-based nursing education programs to previous Korean studies on experienced nurses' competencies that were conducted prior to 2012.

According to one study on nursing clinical competency (Son, 2006), competencies, such as the efficient management of ward tasks, patient-centered care, resource management, clinical judgments and subsequent coping, flexibility and openness, and an inclination toward patient care, were not considered as core competencies for nurses at the advanced beginner and competent levels (1–3 years' experience). The efficient management of ward tasks is considered to be an essential competency at the proficient level; patient-centered care, resource management, clinical judgments and subsequent coping, and flexibility and openness are considered to be essential at the expert level. In this study, by contrast, the efficient management of ward tasks, patient-centered care, resource management, clinical judgments and subsequent coping, flexibility and openness, and an inclination toward patient care were considered as essential competencies for nurses at the competent level. One reason for the differing findings, despite both studies having evaluated the content validity via nurse managers, is related to KABONE's (2012) identification of nursing knowledge, skill performance, and critical thinking as program outcomes for college graduates, although the 12 competencies that were proposed by KABONE are not the same as the six competencies mentioned above. Additionally, Korea's general hospitals recently have required nurses to maintain a higher level of professionalism.

Jang (2000) concluded that nurses at the advanced beginner and competent levels are able to perform complicated nursing care, but are inflexible, and are able to use resources, but need guidance from senior nurses. This indicated that the competencies suggested by Jang also vary from those presented in this study.

This research used the competencies that were suggested by KABONE (2012) as a basic framework and synthesized them with competencies that had been derived from the literature in order to develop a preliminary tool in the form of a matrix. Nursing research, policy awareness, and leadership, three competencies that were suggested by KABONE (2012), were removed related to poor content validity. This might be because adaptability and performance skills outweigh these three competencies for nurses with <3 years' experience. However, it is necessary to reexamine this issue through replication in the context of the fact that higher levels of professionalism recently have been required of advanced beginner and competent nurses.

Although the three competencies that had been removed from the measure have not been considered previously as essential at the advanced beginner and competent levels, it might be possible that these three competencies will be considered to be essential for nurses of these levels by 2020, 3 years after the graduates of KABONE standards-based programs begin their nursing career.

Today, 4 years after KABONE suggested 12 competencies and the majority of nursing colleges nationwide adapted their programs to the new standard, it is time to assess these competencies. With regard to the competencies of nursing research, policy awareness, and leadership, which are emphasized to college students but are not considered to be essential for nurses with <3 years' experience, it is necessary to reach a consensus between education and practice and to ensure that students develop practical competencies that help them to effectively adapt to early-career nursing.

The content validity was twice verified in this research. First, nursing managers were surveyed regarding the core competencies that are essential for nurses with 1–3 years' experience and nine competencies were removed. The removed competencies primarily were related to leadership, training others, research, and management, suggesting that performance skills are more important to nurses with <3 years' experience than training others and organizational management. Second, the content validity was verified by 10 nursing professors. No item was removed, but modifications for expression were implemented. The developed tool consisted of 19 items following the psychometric analyses. The convergent- and criterion-related validity were verified by examining the relationships of the developed tool with an existing performance measurement and a self-leadership scale.

Competencies in nursing research, policy awareness, and leadership were identified by KABONE (2012) and are covered by the standard curriculum of most nursing colleges in South Korea. However, they were removed from the developed tool during the nursing managers' assessment of its content validity; thus, it is possible that there is a gap in the perceptions of standard competencies between nursing colleges and clinical settings. This suggests a need for nursing professionals to bridge this gap in order to increase professionalism and to supplement the functions of KABONE through close cooperation between nursing education and clinical settings in South Korea. In contrast, nursing research, policy awareness, and leadership are important competencies that nurses should have, but they are not as critical as the other competencies until the nurses have >3 years of experience. One of the causes of this is that the questionnaire was worded in a way that asks about their performance (e.g. I care, I solve, I make etc.). This point will be reflected in further research to improve on this methodological limitation. In this study, both authors developed the instrument and examined its content-, construct-, and criterion-related validity. Although it is expected that the instrument should be generalizable to a variety of nursing environments, future assessments should confirm this through the actual application of this instrument.

Limitations of the study

The sampling process of this study was not randomized. However, to ensure that the target nurse population was sufficiently represented, a questionnaire was sent to the nursing departments of four hospitals in the capital and a rural city of South Korea and the data of the nurses who autonomously completed the questionnaire were analyzed. Furthermore, the construct validity of the developed instrument needs to be verified further, such as by confirming the discriminant validity.

CONCLUSION

The standardized outcomes for college graduates that were suggested by KABONE (2012) were combined with the competencies that had been derived from a systematic review, for a total of 47 competencies for nurses with 1–3 years' experience, of which nine were removed related to poor content validity. The 38 competencies then were used as a basis to develop an assessment questionnaire for early-career nurses. A total of 21 items was examined for content and construct validity. Based on these analyses, a new tool for the assessment of core competencies among nurses with 1–3 years' experience

was developed, consisting of 19 items that were scored on a 4-point scale.

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DISCLOSURE

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

S. Y. and Y. K. were involved in the conception, design, data collection, and analysis of this study and critically reviewed the manuscript and contributed to the study process. Both authors read and approved the final manuscript.

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