

# 한국어판 질 향상 및 환자안전 학생평가도구(QSEN-SES)의 신뢰도와 타당도 검증 연구

정현선<sup>1</sup> · 조미정<sup>2</sup> · 이진영<sup>3</sup>

<sup>1</sup>서울여자간호대학교, 조교수 · <sup>2</sup>한림성심대학교, 조교수 · <sup>3</sup>마산대학교, 조교수

## A Study on the Reliability and Validity of the Korean Version of Quality and Safety Education for Nurses-Student Evaluation Survey(QSEN-SES)

Hyun Seon, Jeong<sup>1</sup> · Mi Jung, Cho<sup>2</sup> · Jin Young, Lee<sup>3</sup>

<sup>1</sup>Seoul Women's College of Nursing, Assistant Professor

<sup>2</sup>Department of Nursing, Hallym Polytechnic University, Assistant Professor

<sup>3</sup>Department of Nursing, Masan University, Assistant Professor

### 국문 초록

**연구목적** : 본 연구는 간호대학생의 질 향상 및 환자안전 역량을 평가하기 위해 Quality and Safety Education for Nurses-Student Evaluation Survey를 한국어판으로 번안·개발한 후 신뢰도와 타당도를 검증하는 것을 목적으로 수행되었다. **연구방법** : 서울, 강원, 경남 지역 간호대학생 271명을 대상으로 온라인 설문조사를 실시하였다. 내용타당도는 전문가 5인의 평가를 바탕으로 I-CVI와 S-CVI/Ave를 산출하였다. 구성타당도는 확인적 요인분석을 통해 검토하였고 수렴타당도와 판별타당도, 신뢰도를 분석하였다. **연구결과** : 내용타당도는 문항수준 .80~1.00, 척도수준 .97로 수용 가능하였고, 요인분석의 적합도 분석결과, 기술 척도는 SRMR .05, CFI .91, TLI .89, RMSEA .10으로 모형적합도가 수용 가능한 수준으로 확인되었다. 반면 태도 척도는 모형적합도가 낮게 나타났으나, 요인부하량 .78~.85, AVE .62~.77, CR .87~.91로 수렴타당도는 충족되었다. 전체 도구의 Cronbach's  $\alpha$ 는 .98로 높게 나타났다. **결론** : 한국어판 QSEN-SES는 간호대학생의 질 향상 및 환자안전 역량을 평가하는 도구로 활용 가능한 예비적 근거를 제시하였다. 기술 척도는 수용 가능한 타당도를 보였으나 태도 척도는 추가적인 수정과 문화적 보완이 필요하다. 본 도구는 간호교육과정 개발 및 역량 평가에 기여할 수 있으나, 태도 척도 해석 시 주의가 요구된다.

**주요 용어** : 의료의 질, 환자안전, 간호교육, 교육평가

## I . Introduction

Patient safety and quality of care are essential competencies in fundamental nursing education. Globally, unsafe healthcare environments rank among the top ten causes of death and serious injury, with more than one in ten patients harmed during medical care nearly half of which are considered preventable[1]. In response, the U.S. Institute of Medicine (IOM) emphasized the integration of patient safety into healthcare education to enhance care quality. Core competencies proposed by the IOM include patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics[2,3].

In Korea, the Patient Safety Act was enacted in 2015, establishing an institutional foundation for patient safety initiatives. Since then, the importance of patient safety education has been increasingly recognized, and the six core competencies outlined by the IOM are being emphasized in Korean clinical settings[4]. The fourth revision to the national nursing education accreditation standards has incorporated quality and safety competencies into learning outcomes[5]. Nurses play a pivotal role in preventing adverse events through direct care and clinical monitoring, improving patient outcomes[6]. As the first formal step in professional development, nursing education must ensure that students acquire sufficient competency in quality and safety prior to graduation[7,8].

The Quality and Safety Education for Nurses (QSEN) initiative was launched in 2005 with support from the Robert Wood Johnson Foundation and leadership from the University of North Carolina School of Nursing. QSEN established six core competencies aligned with IOM recommendations: patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics[7]. These are structured across three domains-knowledge, skills, and attitudes-to prepare nursing students for safe and effective

practice in complex healthcare settings.

To measure these competencies, Sullivan et al.[9] developed Quality and Safety Education for Nurses-Student Evaluation Survey (QSEN-SES), targeting graduating nursing students. A systematic review found that while nursing students most frequently reported learning patient-centered care, quality improvement was the least emphasized area in the curriculum[10]. Lindemulder et al.[11] demonstrated that QSEN-based simulations significantly improved students' competencies in teamwork, collaboration, evidence-based practice, and quality improvement. These findings highlight the need for enhanced quality and safety education in nursing programs.

Though QSEN competencies are widely emphasized internationally, QSEN-related studies in Korea are limited. Recent studies have developed safety and quality improvement curricula based on the nursing competencies proposed by QSEN, with the aim of enhancing quality and strengthening patient safety education[12,13]. While elements of quality and safety are introduced in the curriculum, they are not always integrated using validated frameworks or tools. There is a notable lack of instruments to comprehensively evaluate nursing students' competencies related to quality and patient safety education.

This study aimed to translate QSEN-SES into Korean and examine its reliability and validity for use with Korean nursing students. The validated tool will support accurate assessment of student competencies and inform the development of targeted education and training programs to address areas needing improvement.

## II . Methods

### 1. Study design

This was a methodological study aimed at translating

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QSEN-SES developed by Sullivan et al.[9] into Korean and evaluating its validity and reliability.

## 2. Study phases

Phase 1 followed established guidelines for adapting the English tool to other languages and cultures[14]. The instrument was first translated into Korean by a bilingual expert. Three nursing faculty members and two patient safety nursing experts then reviewed the translation for clarity, vocabulary, and cultural appropriateness, after which the Korean version was back-translated into English. The research team compared the back-translated and original versions to ensure semantic equivalence, and finalized the Korean version. Finally, a pretest was conducted with ten nursing students, supplemented by in-depth interviews to evaluate the clarity and cultural relevance of the translated tool.

Phase 2 involved data collection from December 27, 2022, to December 26, 2023. Data were collected through an online survey administered via Google Forms. Participants were fourth-year nursing students enrolled in nursing schools located in Seoul, Gangwon and Gyeongsangnam-do. Inclusion criteria were students who fully understood the purpose of the study and voluntarily provided written informed consent. The minimum required sample size was calculated based on 44 items according to the recommended item-to-subject ratio of 1:5 for instrument validation[15], resulting in a minimum of 220 participants. A total of 271 participants were included in the actual analysis, exceeding the minimum required sample size. A total of 335 questionnaires were distributed, and 279 were returned (response rate: 83.3%). After excluding incomplete and insincere responses, data from 271 participants were included in the final analysis. The knowledge domain items were not included in the sample size calculation, as this scale assessed where students learned their knowledge rather

than their concepts or perceptions[16].

The instrument comprises three domains: knowledge, skills, and attitudes. The knowledge domain includes 19 items, assessing whether content was learned and where (classroom, course assignments, clinical experiences, lab/simulations, not covered). The skills domain contains 22 items rated on a 4-point Likert scale (1=very unprepared to 4=very prepared), assessing how well students are prepared to perform the corresponding skills. The attitudes domain also includes 22 items rated on a 4-point scale (1=very unimportant to 4=very important) and evaluates how important students perceive each competency to be. Higher scores indicate greater preparedness and greater perceived importance for the QSEN competencies. The final score for each domain was calculated as the average of the item scores. No items were reverse-coded. The average time required to complete the survey was approximately 10 minutes. Excluding the knowledge domain items, Cronbach's  $\alpha$  values in previous studies were  $\geq .70$ , ranging from .70 to .94 for the skills scale and .86 to .97 for the attitudes scale[16], whereas in this study, the overall reliability coefficient was .98.

## 3. Statistical analysis

Data were analyzed using SPSS version 22.0 and AMOS version 23.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to summarize participant characteristics. Content, construct, convergent, and discriminant validity were assessed in accordance with the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) guidelines. The COSMIN checklist provides a standardized framework for evaluating the methodological quality of studies examining the measurement properties of patient-reported outcome instruments[17]. Content validity was evaluated using the item-level content validity index (I-CVI) and

average of content validity index for scale (S-CVI/Ave), calculated based on expert ratings using a 4-point relevance scale[18]. An I-CVI  $\geq .78$  and S-CVI/Ave  $\geq .90$  indicated acceptable content validity[19]. Construct validity was examined using item analysis and confirmatory factor analysis (CFA). Exploratory factor analysis (EFA) is typically used to examine the underlying structure of data without prior assumptions regarding the number or relationships of factors[19]. However, because the purpose of this study was to verify the equivalence of the translated tool rather than to explore a new factor structure, EFA was not conducted, consistent with the approach taken in previous studies by Freitas et al.[16].

Model fit was assessed using  $\chi^2$ ,  $\chi^2/df$ , Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Standardized Root Mean Square Residual (SRMR), and Root Mean Square Error of Approximation (RMSEA). Convergent and discriminant validity were tested using Average Variance Extracted (AVE) and Composite Reliability (CR). Reliability was assessed using Cronbach's  $\alpha$  coefficient.

#### 4. Ethical considerations

The study was approved by the Institutional Review Board of S university (IRB No. SWCN-202212-HR-001). Data were collected between December 27, 2022, and December 26, 2023, through an anonymous online survey. To minimize potential coercion, recruitment was

conducted via posted notices rather than by direct faculty approach. Participants were informed of the study's purpose, that their responses would be kept confidential and used solely for research, and that they could withdraw at any time.

### III . Results

#### 1. Participant characteristics and QSEN competencies

The total number of research subjects was 271, of which female students accounted for 94.5% and the majority (88.9%) were in the 20~29 age group (Table 1).

The mean score of the skill domain was 3.10 $\pm$ 0.70 out of 4 points (3=somewhat prepared, 4=very prepared). By item, patient-centered care (3.24 $\pm$ 0.62) was the highest, and quality improvement (2.98 $\pm$ 0.77) was the lowest. The mean score of the attitude domain was 3.53 $\pm$ 0.59 out of 4 points (3=somewhat important, 4=very important), and by item, patient-centered care (3.60 $\pm$ 0.54) was the highest, and quality improvement (3.42 $\pm$ 0.64) was the lowest (Table 2).

#### 2. Validity and reliability

Content validity of the translated tool was evaluated by a panel of five experts, comprising three nursing fac-

**Table 1.** General Characteristics of Participants

(N = 271)

Characteristic	Categories	n(%)
Gender	Female	256(94.5)
	Male	15( 5.5)
Age	<20	1( 0.4)
	20~29	241(88.9)
	30~39	18( 6.6)
	40 $\leq$	11( 4.1)

**Table 2.** Descriptive Results for the Skills and Attitudes of QSEN Competencies (N = 271)

QSEN competencies †	Skills		QSEN competencies †	Attitudes	
	Mean	SD		Mean	SD
	3.10	0.70		3.53	0.59
PC	3.24	0.62	PC	3.60	0.54
I	3.16	0.67	S	3.59	0.57
S	3.07	0.73	I	3.58	0.55
TC	3.05	0.73	EB	3.48	0.61
EB	3.01	0.73	TC	3.45	0.65
QI	2.98	0.77	QI	3.42	0.64

† QSEN competencies are listed in descending order for highest to lowest mean levels. QSEN=Quality and safety education for nurses; PC=Patient-centered care; EB=Evidence-based practice; TC=Teamwork and collaboration; QI=Quality improvement; S=Safety; I=Informatics; SD=Standard Deviation

ulty members and two patient safety nursing experts. The I-CVI ranged from .80 to 1.00, exceeding the acceptable threshold of .78. The S-CVI/Ave was .97, confirming the overall appropriateness of the translated items.

The adequacy of the sample for factor analysis was supported by a Kaiser-Meyer-Olkin value of .91, indicating meritorious sampling adequacy[19,20]. Bartlett’s test of sphericity was also significant ( $\chi^2=15,934.26$ ,  $p < .001$ ), validating the suitability of the dataset for factor analysis. Construct validity was assessed through CFA of the skills and attitudes domains(Table 3). For the skills domains, the model demonstrated acceptable fit indices (SRMR=.05; CFI=.91; TLI=.89; RMSEA=.10;  $\chi^2/df=3.50$ ;  $p < .001$ ). Although the TLI was slightly below the ideal threshold of 0.90, the overall model fit was considered acceptable[19]. The standardized factor load-

ings for the skills domains ranged from .70 to .91, with AVE values between .63 and .77 and CR values between .93 and .95, all exceeding recommended thresholds, thereby confirming convergent validity (Table 4, Figure 1). The attitudes domains showed suboptimal model fit indices( $\chi^2/df=4.85$ ;  $p < .001$ ; CFI=.87; TLI=.85; RMSEA=.12; SRMR=.06). However, the standardized factor loadings for the attitudes domain ranged from .75 to .89, with AVE values between .62 and .77 and CR values between .87 and .91, supporting adequate convergent validity(Table 5, Figure 2). Internal consistency reliability for the Korean version of the QSEN-SES was high, with Cronbach’s  $\alpha$  ranging from .86 to .90 for the skills domain and from .82 to .92 for the attitudes domain, confirming strong internal consistency(Table 4,5).

**Table 3.** Fit Indices in Confirmatory Factor Analysis (N = 271)

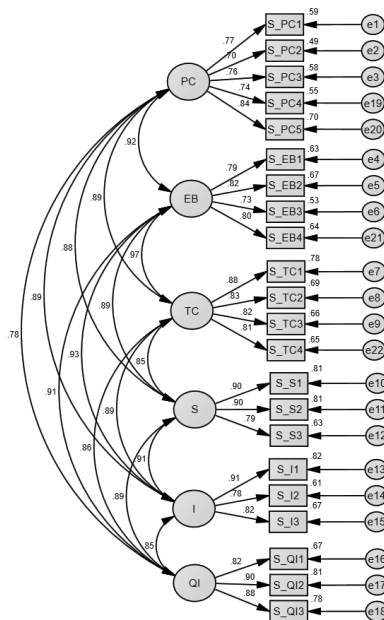
Model	Skills	Attitudes	Reference criteria
$\chi^2/df(p)$	3.50(<.001)	4.85(<.001)	≤3
CFI	.91	.87	≥.90
TLI	.89	.85	≥.90
RMSEA	.10	.12	≤.10
SRMR	.05	.06	≤.08

CFI=Comparative Fit Index; TLI=Tucker-Lewis Index; RMSEA=Root Mean Square Error of Approximation; SRMR=Standardized Root Mean Square Residual

**Table 4.** Results of Confirmatory Factor Analysis for the Skill Domain (N=271)

Factors	Item no.	B	$\beta$	SE	Critical ratio	$\rho$	AVE	CR	Cronbach's $\alpha$	Item-total r
PC	1	1.00	.77	—	—	<.001	.63	.94	.86	.71
	2	0.93	.70	.08	11.83	<.001				
	3	1.18	.76	.09	13.16	<.001				
	4	1.01	.74	.08	12.72	<.001				
	5	1.21	.84	.08	14.70	<.001				
EB	6	1.00	.79	—	—	<.001	.64	.93	.87	.71
	7	0.90	.82	.06	15.42	<.001				
	8	0.76	.73	.06	13.18	<.001				
	9	0.91	.80	.06	14.90	<.001				
TC	10	1.00	.88	—	—	<.001	.66	.94	.87	.81
	11	1.02	.83	.06	18.33	<.001				
	12	0.74	.82	.04	17.64	<.001				
	13	0.92	.81	.05	17.39	<.001				
S	14	1.00	.90	—	—	<.001	.75	.95	.89	.80
	15	0.89	.90	.06	22.59	<.001				
	16	0.81	.79	.06	17.25	<.001				
QI	17	1.00	.82	—	—	<.001	.77	.95	.90	.82
	18	1.00	.90	.06	18.16	<.001				
	19	1.05	.90	.06	17.62	<.001				
I	20	1.00	.91	—	—	<.001	.70	.93	.90	.82
	21	0.89	.78	.05	16.97	<.001				
	22	0.81	.82	.04	18.51	<.001				

PC=Patient-centered Care; EB=Evidence-Based practice; TC=Teamwork and Collaboration; QI=Quality Improvement; S=Safety; I= Informatics;  $\beta$  =Standardized Estimate; SE=Standard Error; AVE=Averaged Variance Extracted; CR=Construct Reliability

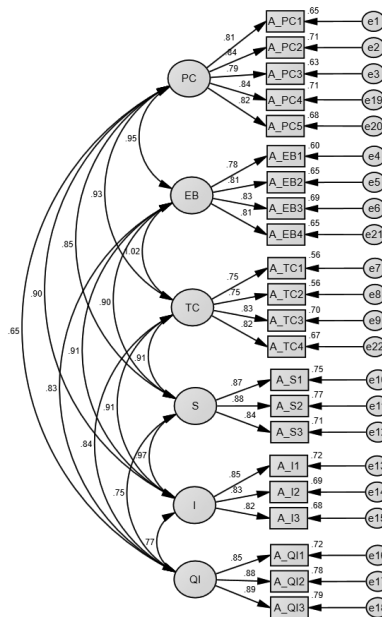


**Figure 1.** Confirmatory factor analysis path diagram for the skills domain

**Table 5.** Results of Confirmatory Factor Analysis for the Attitudes Domain (N=271)

Factors	Item no.	B	$\beta$	SE	Critical ratio	$\rho$	AVE	CR	Cronbach's $\alpha$	Item-total r
PC	1	1.00	.81	—	—	<.001	.68	.91	.92	.78
	2	1.02	.84	.06	16.40	<.001				.82
	3	1.06	.80	.07	15.06	<.001				.74
	4	1.06	.84	.07	16.31	<.001				.82
	5	1.01	.82	.06	15.86	<.001				.82
EB	6	1.00	.78	—	—	<.001	.65	.88	.88	.71
	7	1.00	.81	.07	14.82	<.001				.73
	8	1.03	.83	.07	15.43	<.001				.80
	9	0.98	.81	.07	14.80	<.001				.72
TC	10	1.00	.75	—	—	<.001	.62	.87	.82	.69
	11	1.12	.75	.09	12.81	<.001				.72
	12	0.96	.83	.07	14.57	<.001				.64
	13	0.95	.82	.07	14.28	<.001				.78
S	14	1.00	.87	—	—	<.001	.75	.90	.90	.82
	15	1.01	.88	.05	19.94	<.001				.81
	16	1.03	.85	.06	18.45	<.001				.77
QI	17	1.00	.85	—	—	<.001	.77	.91	.91	.80
	18	1.02	.89	.06	18.58	<.001				.82
	19	1.02	.89	.05	18.73	<.001				.82
I	20	1.00	.85	—	—	<.001	.70	.87	.91	.76
	21	0.96	.83	.06	17.32	<.001				.81
	22	1.01	.82	.06	17.10	<.001				.78

PC=Patient-centered Care; EB=Evidence-Based practice; TC=Teamwork and Collaboration; QI=Quality Improvement; S=Safety; I= Informatics;  $\beta$  =Standardized Estimate; SE=Standard Error; AVE=Averaged Variance Extracted; CR=Construct Reliability



**Figure 2.** Confirmatory factor analysis path diagram for the attitudes domain

## IV. Discussion

This study aimed to evaluate the reliability and validity of Korean version of QSEN-SES, focusing on the skills and attitudes domains. The findings support the translated tool as a psychometrically sound instrument for assessing Korean nursing student competencies in quality improvement and patient safety.

The high I-CVI (.80~1.00) and S-CVI/Ave (.97) values obtained during the content validity assessment indicate strong agreement among five experts regarding the relevance and clarity of the translated items. These values align with the content validity standards recommended by Polit et al.[18], supporting the appropriateness of the translation for use in Korean nursing education contexts. The results of the CFA provide partial support for the construct validity of the tool. The skills domain demonstrated an acceptable model fit based on the CFI, RMSEA, and SRMR values, although the TLI did not reach the ideal threshold. Although some indicators do not meet the criteria, the model can be considered acceptable if it satisfies two or three of the important goodness-of-fit indicators in the interpretation of CFA results[21]. In addition, considering that the SRMR and CFI met the recommended thresholds, and the TLI was near the cutoff, the model can be interpreted as having acceptable overall fit. These findings suggest that the skills domain of QSEN-SES maintains a valid factor structure after translation, reflecting the multidimensional nature of safety-related skills emphasized in Korean nursing curriculum.

In contrast, the attitudes domain showed relatively poor model fit. The CFI and TLI did not meet the recommended threshold of .90, and the RMSEA was .12, which exceeds the acceptable limit of .08, suggesting a poor fit[22]. The  $\chi^2/df$  ratio was 4.85 ( $p < .001$ ), with a mean-adjusted  $\chi^2/df$  value greater than 3 suggested to indicate significant misfit using a cross-validation dataset.

However, although it is helpful to suggest a simple rule of thumb to assess misfit using the mean-adjusted  $\chi^2/df$ , a threshold of 3 is difficult to apply under varying sample sizes and test lengths[23]. Nevertheless, these results suggest that the proposed factor structure does not fully align with the observed data. Similar findings were reported in the Brazilian validation study, where the attitude domain also demonstrated low model fit indices and several items with weak loadings[16]. Likewise, studies conducted in other cultural contexts have highlighted the challenges of measuring abstract constructs such as attitudes, indicating that this limitation is not unique to the Korean version but may be inherent to the QSEN-SES framework. For example, Alavi et al.[24] highlighted the significant difficulty of ensuring conceptual, item, semantic, and operational equivalence in the process of ensuring cross-cultural validity of assessment instruments. Similarly, van den Broek et al.[25] translated and validated a tool into Dutch and found that while initial content validity and exploratory factor structures could be established, the tool required further refinement to achieve robust construct validity, demonstrating the broader challenges in measuring attitudes across cultures.

Among the methods of measuring attitudes, direct measurement assesses the emotional, cognitive, and behavioral intentions of respondents toward a given concept[26]. Attitude is a more abstract concept than behavior, and there may be large differences in cognitive interpretation and response by learner. This variation may be due to cultural or educational differences in the way nursing students perceive and internalize safety attitudes or to measurement difficulties in capturing abstract concepts such as attitudes. Further research is needed to improve and restructure the items within the attitudes domain to increase the fit with the Korean sample.

Despite these limitations, the Korean version of QSEN-SES provides preliminary evidence for its use in evaluating quality and safety competencies among

Korean nursing students. The skills domain showed acceptable construct validity, whereas the attitudes domain demonstrated limited model fit, likely due to challenges in translation and cultural adaptation. This preliminary validation highlights the need for culturally sensitive refinement and further research with larger, diverse samples to enhance the tool's psychometric soundness. The tool also demonstrated excellent internal consistency reliability, with a Cronbach's alpha of .98. This result is consistent with previous validation studies of the original QSEN-SES[9] and supports the internal coherence of the Korean version. The high reliability of QSEN-SES has been verified in previous studies, with a Cronbach's  $\alpha$  of .94[27] in a study conducted in the United States and a value greater than .70 in a Brazilian population[16].

Despite the positive findings, several limitations should be acknowledged. First, the sample was limited to Korean nursing students from specific institutions, which may affect generalizability. Second, although content and construct validity were addressed, other forms of validity such as criterion-related or predictive validity were not examined. Last, the suboptimal CFA results for the attitudes domain suggest a need for further psychometric refinement and possible cultural adaptation.

## V. Conclusions

This study confirmed that the Korean version of QSEN-SES tool, which was used to evaluate the quality improvement and patient safety competencies of Korean nursing students, demonstrated validity and reliability. The final Korean version of the questionnaire consisted of a 22-item skill domain, and a 22-item attitude domain, reflecting the six core QSEN competencies. The tool showed high content validity and internal consistency, and acceptable construct validity in the skills domain. However, the attitudes domain did not fully meet the

model fit criteria, indicating the need for refinement or re-examination of certain items in future research. Therefore, while the Korean version of QSEN-SES can serve as a useful instrument to evaluate the quality and safety competencies of Korean nursing students and to support the development of evidence-based curricula, caution is required when interpreting the results of the attitudes domain.

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