



OPEN Adaptation of the quality of oncology nursing care scale for patients undergoing cancer treatment in South Korea

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We evaluated the reliability and validity of the Korean translation of the quality of oncology nursing care scale (K-QONCS) and verified its suitability as a tool to assess the quality of cancer patient care in Korea. To validate the content validity of the K-QONCS, five oncology nurse experts assessed the suitability of the adapted tools. Exploratory factor analysis (EFA) was used to assess construct, convergent, discriminant, and criterion validity. A survey of 235 adults aged > 18 years who had been diagnosed with cancer and were receiving treatment was conducted to validate the K-QONCS. The QONCS was translated and appropriately modified to reflect expert opinion, and its content validity was confirmed to be high through indicators such as item-level content validity index, scale-level content validity index using an averaging calculation (S-CVI/Ave), and S-CVI/universal agreement. Eight factors were derived by EFA; each factor reflected different aspects of quality of care. The scale exhibited convergent and discriminant validity, demonstrated by multitrait-multimethod matrix analysis and correlation analysis with the Nursing Satisfaction Scale. The Cronbach's alpha coefficient was 0.92, indicating high overall internal consistency. We demonstrated the reliability and feasibility of the K-QONCS. The K-QONCS may help oncology nurses to improve patient care experiences and outcomes as well as advance oncology nursing practices in South Korea.

Keywords Korea, Oncology nursing, Quality of health care, Questionnaire, Validation

Ensuring high-quality oncological nursing care is a critical objective for healthcare providers^{1,2}. Nurses play an indispensable role in attaining and maintaining high-quality, personalized care of patients with cancer^{3,4}. Their impact is attributed to the time spent with patients, establishment of intimate relationships, development of trust, and effective communication⁵⁻⁷.

Patients undergoing cancer treatment encounter multiple health-related challenges and have specific needs that require complex and individualized care, necessitating a multidisciplinary approach and comprehensive support to patients and their families^{8,9}. Within this multidisciplinary framework, clinical nurse specialists and advanced nurse practitioners identify and address the physical, psychological, and social needs of patients^{8,10}. The timely identification of care gaps that may negatively impact the perceived level of patient-care is important. Nurses rely on their advanced communication skills to bridge the gap between service providers and patients to achieve a holistic assessment of patients' needs and promote patient-centered care^{11,12}.

Despite the complexity of cancer care and the importance of quality nursing care, no consensus for defining quality cancer care is available^{13,14} and only few disease-specific questionnaires are available. Existing questionnaires, such as the oncology patients' perceptions of the quality of nursing care scale (OPPQNCS)¹⁵, the quality patient care scale¹⁶, and the palliative care quality of life instrument¹⁷, are restricted in their use as lack a clear definition of quality nursing care and a theoretical framework informing their development¹⁵. Furthermore, some questionnaires are not based on patients' perceptions, thereby limiting their validity. The holistic aspects of care, including patients' spiritual needs, are not adequately addressed in existing questionnaires, including the OPPQNCS. Given that cancer patients frequently experience psychological distress, fear of cancer recurrence (FCR), and existential concerns in addition to their physical symptoms, a more comprehensive measurement tool that accounts for these multidimensional aspects is necessary (13)¹⁸. Most existing questionnaires focus on

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the overall quality of care rather than on nursing care, and often fail to focus on the unique needs stemming from cancer diagnosis and treatment.

Additionally, previous studies have highlighted the impact of nursing quality on clinical outcomes, patient satisfaction, and adherence to treatment, emphasizing the need for precise assessment tools in oncology nursing^{3,6}. Nursing care that effectively addresses patients' emotional and informational needs has been linked to improved psychological well-being and reduced symptom burden among cancer patients¹⁹. Therefore, a validated tool that captures the specific components of high-quality oncology nursing care is essential for improving patient outcomes and guiding evidence-based nursing practice.

Adapting assessment tools developed abroad to the unique characteristics of oncology nursing care in South Korea presents with several challenges. Cultural, language, and healthcare systems differences must be considered to ensure the relevance and applicability of the instrument^{13,14}. For instance, cultural differences in patient expectations, communication styles, and perceptions of nursing care may influence how patients interpret and respond to questionnaire items, necessitating careful linguistic and contextual adaptation (21)²⁰. Without an appropriate evaluation criteria, patients cannot effectively communicate their expectations to staff members. Consequently, an evaluation tool designed specifically to assess the quality of oncology nursing care in Korean oncology units is needed.

Thus, this study aimed to address this need by translating the QONCS into Korean and adapting it to the South Korean context; the QONCS was originally developed by Charalambous and Adamakidou¹⁴. This adaptation process followed rigorous translation and validation procedures, ensuring that the Korean version maintains conceptual equivalence with the original while reflecting the unique cultural and healthcare characteristics of South Korea²¹. The Korean version of the QONCS (K-QONCS) would support ongoing efforts to enhance the overall quality of oncology nursing care provided to patients with cancer in South Korea.

Methods

Participants

The study included patients with cancer aged ≥ 18 years who were undergoing cancer treatment. As the number of participants for the exploratory factor analysis (EFA) of the composition validity test should be 5–10 times the number of items²², a minimum of 204 participants were needed (i.e., 6 times the number of items, based on 34 items). Considering a dropout rate of 20%, we planned to recruit 255 participants. Finally, 245 participants were recruited, and the data of 235 participants were obtained after excluding four duplicates and six dishonest survey responses (e.g., all responses answered with the same number). This resulted in a final response rate of 95.9%.

Instrument: QONCS

The QONCS is a tool¹⁴ used to explore the quality of nursing care provided in oncology settings from the patient's perspective. It consists of five sub-dimensions and 34 questions. The sub-dimensions are as follows: being supported and confirmed (16 items), spiritual care (6 items), sense of belonging (5 items), being valued (4 items), and being respected (3 items). Scores are measured on a 5-point Likert scale, graded between 1 (completely disagree) and 5 (completely agree). Higher scores indicate a higher quality of oncology nursing care, and vice-versa. The Cronbach's alpha for the 34 items was 0.95¹⁴.

Process

Translation

The translation process followed the World Health Organization guidelines²¹. First, two bilingual English and Korean translators translated the tool from English to Korean. The authors then checked the translation for terminology, wording, and clarity. The translation was then back-translated by an independent researcher fluent in both English and Korean. The authors checked the original tool and the Korean version for inconsistencies. After a consensus was achieved, the translation was finalized.

Content validity

To validate the content validity of the K-QONCS, five experts, including two nurses with 10 years of experience in caring for cancer patients and three professors specialized in basic and adult nursing, evaluated the adapted tool for suitability. The expert group rated content equivalence on a 4-point Likert scale (1=not relevant, 2=somewhat relevant but needs modification, 3=quite relevant but needs some modification, 4=highly relevant)²³. After evaluating the validity, we calculated the item-level content validity index (I-CVI) and scale-level content validity index using an averaging calculation (S-CVI/Ave). Content validity was considered adequate if the I-CVI was ≥ 0.78 and the S-CVI was ≥ 0.90 ²⁴.

Data collection

Convenience sampling was used to recruit participants and an online survey link was distributed through blogs and forums in which patients with cancer participate. Before participation, potential respondents were provided a written explanation of the study's purpose, methodology, and voluntary nature of participation on a web page. They were assured that their privacy and confidentiality were protected. To obtain informed consent, participants were asked to indicate their agreement by clicking a "Next" button to proceed with the online survey. Participants could withdraw from the study at any time without any consequences. All methods in this study were performed in accordance with the relevant guidelines and regulations, ensuring compliance with ethical and procedural standards.

Data quality control

To ensure data quality and reliability, several measures were implemented. The survey was conducted through the Embrain survey platform, a reputable and widely used online survey service in South Korea, ensuring access to a structured and diverse respondent pool beyond informal online forums. Participants were required to meet specific inclusion criteria (e.g., age ≥ 18 years, current cancer treatment) before proceeding with the survey to ensure that only relevant participants contributed data.

To improve data integrity, consistency checks were implemented to identify and exclude low-quality responses. This included screening for duplicate entries, unusually fast completions, and uniform response patterns (e.g., selecting the same number for all questions). Additionally, participants were informed about the importance of providing accurate and truthful responses and were assured of data anonymity to minimize potential biases.

Validity test

To assess construct validity, an EFA was conducted. Additionally, convergent validity, discriminant validity, and criterion validity were verified.

Exploratory factor analysis

EFA used principal component analysis and varimax rotation to extract potential factors from the data.

Convergent and discriminant validity

A multitrait-multimethod (MTMM) matrix was used to verify convergent and discriminant validity. When the correlation coefficient exceeded 0.40 after accounting for the overlap between the subfactors to which the item belonged, it was considered to have adequate convergent validity²⁵. If the difference between the item's correlation with its subscale and its correlation with other subscales was larger than twice the standard error of correlation coefficients, the item was considered to have discriminant validity^{25,26}.

Criterion validity

To evaluate the validity of the K-QONCS, we used the Patient Satisfaction Instrument (PSI) developed by Hinshaw and Atwood²⁷ that was adapted into Korean by Yang²⁸. This tool was developed to measure nursing satisfaction among hospitalized patients and consists of the following domains: technical-professional care (7 items), patient education (7 items), and trust (11 items). The reliability and validity of this instrument have been reported²⁹ and it has been used in several studies^{30,31}. The validity of the instrument has been verified through correlation analysis, with higher correlations indicating higher validity.

Reliability

Reliability was measured by calculating Cronbach's α value, which measures acceptable internal consistency. Cronbach's α for each factor of the 34-item K-QONCS and Cronbach's α for the total items were analyzed.

Data analysis

SPSS version 26.0 (SPSS Inc., Chicago, IL, USA) was used to analyze the data. Descriptive statistics were used for general characteristics and item analysis. Construct validity was verified using EFA. Convergent and discriminant validity was verified through MTMM. Pearson's correlation coefficient was used to assess validity and reliability.

Results

Characteristics of study participants

Table 1 shows the general characteristics of study participants. The mean age of the participants was 42.80 years (standard deviation [SD] = 7.99), and more than two-thirds were female. Over 70% of the participants were married, and about three-quarters had a university degree or higher education. Breast cancer was the most common cancer type, followed by stomach and thyroid cancers. Stage 2 was the most common cancer stage and chemotherapy was the most common treatment modality. Most patients had been diagnosed 1–2 years earlier, followed by those diagnosed in less than a year.

Validity

Content validity

Content validity was verified using the I-CVI and the S-CVI/Ave and the S-CVI/universal agreement (S-CVI/UA) (Online Resource 1). The I-CVI was ≥ 0.8 , whereas the S-CVI/Ave was 0.95 and S-CVI/UA was 0.74. No questions were deleted based on the results of content validity verification. Additionally, appropriate modifications were made to reflect the opinions of experts and words were corrected.

EFA

The factor structure was validated by EFA. The Kaiser–Meyer–Olkin (KMO) score was 0.88 and the Bartlett sphericity was 3012.22 ($p < .001$), indicating a suitable fit for EFA³². Principal component analysis and varimax rotation revealed that the communality of the 34 items ranged from 0.33 to 0.79, with all items having a value > 0.3 . Eight factors in the K-QONCS had eigenvalues > 1.00 and were above the elbow of the curve in the scree plot. These factors explained 58.59% of the total variance, with all factors having a loading of 0.33–0.79 (Table 2).

Factor 1 is “Spiritual care and sense of belonging” and includes nine items (items 17, 18, 19, 20, 21, 22, 23, 24, 27) and has an explanatory power of 13.75%. Factor 2 is “Be supported” and contains six items (items 1, 6, 10, 12, 29, 33) and has an explanatory power of 8.33%. Factor 3 is “Be valued” and includes four items (items 4, 16, 30, 32) and has an explanatory power of 6.93%. Factor 4 is “Get sufficient information” and includes three items (items 8, 11, and 34) and has an explanatory power of 6.69%. Factor 5 is “Trustfulness” and includes three

Variables	Data
Age, years, mean \pm SD	42.80 \pm 7.99
Sex, n (%)	
Male	72 (30.6)
Female	163 (69.4)
Family status, n (%)	
Married	166 (70.6)
Unmarried	63 (26.8)
Divorced	6 (2.6)
Educational level, n (%)	
High school or less	58 (24.7)
University or higher	177 (75.3)
Type of cancer, n (%)	
Breast	98 (41.7)
Stomach	29 (12.3)
Thyroid	26 (11.1)
Colon	14 (6.0)
Cervical	10 (4.3)
Lung	8 (3.4)
Liver	6 (2.6)
Others	44 (18.6)
Cancer stage, n (%)	
0	4 (1.7)
1	88 (37.4)
2	101 (43.0)
3	22 (9.4)
4	20 (8.5)
Type of treatment, n (%)	
Chemotherapy	92 (39.1)
Radiotherapy	44 (18.7)
Hormone therapy	43 (18.3)
Surgery	51 (21.7)
Others	5 (2.1)
Time after diagnosis (year), n (%)	
Less than 1	69 (29.4)
1–2	129 (54.9)
3–4	29 (12.3)
More than 5	5 (2.1)

Table 1. Demographic characteristics of the study participants ($N=235$). SD, standard deviation.

items (items 5, 9, 13) and has an explanatory power of 6.68%. Factor 6 is “Be understood” and includes four items (items 3, 7, 14, 25) and has an explanatory power of 6.62%. Factor 7 is “Be respected” and includes three items (items 15, 26, 28) and has an explanatory power of 5.80%. Factor 8 is “Be cared” and includes two items (items 2, 31) and has an explanatory power of 3.80%.

Furthermore, to assess the presence of common method bias (CMB), we conducted Harman’s Single-Factor Test as part of the exploratory factor analysis (EFA). The results confirmed that the first factor accounted for less than 50% of the total variance, indicating that CMB is not a significant concern in this study.

Convergent and discriminant validity

According to the MTMM matrix, the correlation coefficients among the 34 items and their factors were 0.57–0.83 (all >0.4); thus, convergent validity was verified. Regarding discriminant validity, the correlation coefficients of each item with the factors to which they did not belong ranged from 0.10 to 0.50. In addition, the correlations between the items and their corresponding factors were larger than between the items and other factors by double the standard error of correlation coefficients, for all items. Therefore, discriminant validity was confirmed (Table 3).

Criterion validity

Discriminant validity was verified through correlation analysis of the K-QONCS and the Nursing Satisfaction Scale. The K-QONCS and Nursing Satisfaction Scale showed a significant moderate level of correlation ($r = .41$,

Item no.	Community	Factor structure								
		1	2	3	4	5	6	7	8	
Factor 1: Spiritual care and a sense of belonging	Item 21	0.68	0.79	-0.07	0.08	0.07	0.09	0.08	0.10	0.14
	Item 19	0.68	0.79	-0.04	0.16	0.11	-0.06	-0.06	0.09	-0.05
	Item 20	0.63	0.79	0.07	0.03	0.01	0.00	0.08	0.06	-0.02
	Item 18	0.58	0.67	0.30	0.16	0.01	-0.02	0.07	0.06	-0.03
	Item 22	0.59	0.66	0.32	-0.02	-0.07	-0.05	0.16	0.11	0.00
	Item 17	0.62	0.65	0.03	0.09	0.16	0.00	0.02	0.13	0.37
	Item 27	0.58	0.55	0.28	0.02	0.22	0.27	0.18	-0.18	0.07
	Item 23	0.47	0.50	-0.03	0.06	0.39	0.20	0.13	0.04	-0.09
Factor 2: Be supported	Item 24	0.48	0.48	0.19	0.04	0.16	0.19	-0.06	0.37	0.11
	Item 29	0.65	0.11	0.68	-0.06	0.18	0.34	0.10	-0.08	-0.02
	Item 12	0.58	-0.01	0.61	0.16	0.18	-0.18	0.14	0.28	0.11
	Item 33	0.50	0.32	0.56	0.20	-0.12	0.10	0.10	0.08	0.08
	Item 6	0.51	0.07	0.48	0.40	0.14	0.04	0.24	0.17	0.12
	Item 1	0.39	0.14	0.46	0.25	0.27	0.10	0.04	-0.06	0.07
Factor 3: Be valued	Item 10	0.47	0.09	0.44	0.23	0.22	0.16	0.18	0.30	0.12
	Item 16	0.61	0.09	0.12	0.69	-0.02	0.10	0.29	0.00	0.12
	Item 30	0.55	0.15	0.18	0.57	0.16	0.25	0.09	0.25	-0.13
	Item 4	0.61	0.30	0.29	0.54	0.33	0.15	-0.05	0.00	0.09
Factor 4: Get sufficient information	Item 32	0.59	0.14	0.11	0.49	0.32	0.24	-0.11	0.38	-0.08
	Item 8	0.66	0.11	0.22	0.16	0.71	-0.01	0.01	0.13	0.22
	Item 34	0.53	0.18	0.15	0.04	0.56	0.01	0.28	0.27	0.03
Factor 5: Trustfulness	Item 11	0.55	0.00	0.10	0.22	0.46	0.46	0.27	-0.02	-0.05
	Item 13	0.74	-0.04	0.06	0.21	-0.01	0.79	0.06	0.13	0.21
	Item 9	0.64	0.10	0.14	0.39	-0.01	0.57	0.32	0.07	0.17
Factor 6: Be understood	Item 5	0.39	0.27	0.16	0.26	0.23	0.33	0.15	0.16	0.10
	Item 25	0.63	0.32	-0.03	0.10	0.28	0.19	0.60	0.01	-0.22
	Item 14	0.63	0.02	0.21	0.16	0.40	-0.15	0.59	-0.04	0.16
	Item 3	0.54	-0.03	0.28	0.17	-0.05	0.26	0.56	0.22	-0.05
Factor 7: Be respected	Item 7	0.46	0.19	0.25	0.11	-0.06	0.22	0.47	0.17	0.20
	Item 26	0.64	0.29	0.21	0.11	0.02	0.13	0.03	0.67	0.17
	Item 28	0.71	0.11	-0.16	0.29	0.24	-0.04	0.37	0.61	0.13
Factor 8: Be cared for	Item 15	0.73	0.13	0.38	-0.24	0.16	0.43	0.13	0.45	-0.28
	Item 2	0.60	0.11	0.18	0.12	0.14	0.26	0.02	0.27	0.62
	Item 31	0.72	0.13	0.16	-0.11	0.33	0.25	0.49	-0.09	0.50
Eigenvalue			4.67	2.83	2.35	2.28	2.27	2.25	1.97	1.29
Variance (%)			13.75	8.33	6.93	6.69	6.68	6.62	5.80	3.80
Cumulative (%)			13.75	22.08	29.00	35.70	42.37	48.99	54.79	58.59

Table 2. Exploratory factor analysis of the K-QONCS ($N=235$). Significant values are in bold. K-QONCS, Korean version of the quality of oncology nursing care scale.

$p < .001$). In addition, each factor of the K-QONCS showed a significantly lower level of correlation with the Nursing Satisfaction Scale. These results confirmed the validity of the K-QONCS (Table 4).

Item analysis

The results of the questionnaire analysis are shown in Table 5. Each question had a mean score of 3.39–4.11 and an SD of 0.72–1.28, with no outliers. The skewness of each question ranged from -0.99 to -0.32, and the kurtosis ranged from -0.98 to 0.95, with no skewed values. The item-total correlation coefficient ranged from 0.57 to 0.79, indicating that no item was a low contributor to the instrument¹⁸. In addition, the alpha obtained if an item was deleted ranged from 0.32 to 0.87.

Reliability

Internal validity tests showed that Cronbach's alpha coefficients for all items of the K-QONCS were 0.92, ranging from 0.50 to 0.87 for individual factors.

Discussion

In this study, we translated the QONCS to Korean and adapted it for patients diagnosed with cancer. Content validity ensures that the items included in the instrument adequately represent the construct of interest. Here,

Factor	No. of the item	Factor								2SE
		1	2	3	4	5	6	7	8	
Factor 1: Spiritual care and a sense of belonging	21	0.79	0.21	0.30	0.22	0.28	0.26	0.31	0.24	0.04
	19	0.77	0.19	0.31	0.21	0.12	0.16	0.27	0.10	0.04
	20	0.78	0.24	0.27	0.15	0.18	0.21	0.26	0.18	0.04
	18	0.71	0.40	0.36	0.22	0.22	0.27	0.30	0.24	0.05
	22	0.69	0.35	0.24	0.22	0.19	0.26	0.31	0.23	0.05
	17	0.71	0.28	0.31	0.30	0.24	0.26	0.31	0.33	0.05
	27	0.64	0.42	0.33	0.37	0.35	0.39	0.23	0.33	0.05
	23	0.58	0.29	0.33	0.31	0.25	0.32	0.29	0.26	0.05
	24	0.60	0.39	0.35	0.33	0.34	0.25	0.44	0.25	0.05
Factor 2: Be supported	29	0.26	0.67	0.28	0.33	0.36	0.34	0.25	0.31	0.05
	12	0.19	0.67	0.36	0.31	0.22	0.31	0.34	0.25	0.05
	33	0.40	0.64	0.36	0.24	0.32	0.33	0.30	0.24	0.05
	6	0.29	0.70	0.50	0.37	0.36	0.43	0.37	0.36	0.05
	1	0.27	0.57	0.39	0.34	0.28	0.35	0.24	0.29	0.05
	10	0.29	0.71	0.48	0.40	0.42	0.42	0.41	0.39	0.05
Factor 3: Be valued	16	0.21	0.39	0.68	0.30	0.42	0.37	0.25	0.24	0.05
	30	0.30	0.45	0.72	0.36	0.50	0.37	0.39	0.22	0.05
	4	0.43	0.50	0.77	0.49	0.40	0.32	0.29	0.28	0.04
	32	0.31	0.39	0.72	0.38	0.40	0.26	0.44	0.22	0.05
Factor 4: Get sufficient information	8	0.30	0.43	0.41	0.74	0.26	0.31	0.33	0.39	0.04
	34	0.34	0.37	0.37	0.76	0.29	0.41	0.41	0.34	0.04
	11	0.17	0.33	0.41	0.74	0.47	0.43	0.33	0.34	0.04
Factor 5: Trustfulness	13	0.11	0.30	0.38	0.27	0.78	0.28	0.30	0.34	0.04
	9	0.26	0.41	0.52	0.34	0.79	0.44	0.36	0.44	0.04
	5	0.38	0.42	0.46	0.44	0.74	0.40	0.35	0.34	0.04
Factor 6: Be understood	25	0.38	0.28	0.31	0.38	0.32	0.71	0.30	0.27	0.05
	14	0.19	0.40	0.27	0.47	0.24	0.70	0.22	0.36	0.05
	3	0.14	0.42	0.32	0.33	0.42	0.65	0.36	0.27	0.05
	7	0.30	0.43	0.36	0.24	0.37	0.70	0.37	0.37	0.05
Factor 7: Be respected	26	0.41	0.42	0.36	0.31	0.36	0.29	0.79	0.26	0.04
	28	0.26	0.25	0.43	0.39	0.28	0.39	0.72	0.32	0.05
	15	0.25	0.39	0.24	0.35	0.31	0.32	0.68	0.23	0.05
Factor 8: Be cared	2	0.26	0.37	0.34	0.32	0.40	0.27	0.38	0.80	0.04
	31	0.28	0.39	0.21	0.45	0.40	0.47	0.24	0.83	0.04

Table 3. Multitrait-multimethod matrix of the K-QONCS ($N = 235$). SE, standard error of correlation coefficient; K-QONCS, Korean version of the quality of oncology nursing care scale.

K-QONCS	Patient satisfaction instrument	p
Total score	0.410	<0.001*
Factor 1. Spiritual care and sense of belonging	0.376	<0.001*
Factor 2. Be supported	0.285	<0.001*
Factor 3. Be valued	0.320	<0.001*
Factor 4. Get sufficient information	0.269	<0.001*
Factor 5. Trustfulness	0.261	<0.001*
Factor 6. Be understood	0.238	<0.001*
Factor 7. Be respected	0.243	<0.001*
Factor 8. Be cared for	0.208	<0.001*

Table 4. Correlations between the K-QONCS and the patient satisfaction instrument ($N = 235$). K-QONCS, Korean version of the quality of oncology nursing care scale. * $p < .001$.

Item No.	Mean	SD	Skewness	Kurtosis	ITC	α if item was deleted	Cronbach's α
K-QONCS	130.77	16.46	-0.39	0.24	-	-	0.92
Factor 1. Spiritual care and sense of belonging							0.87
Item 21	3.39	1.16	-0.51	-0.51	0.79	0.85	
Item 19	3.46	1.23	-0.46	-0.78	0.77	0.85	
Item 20	3.33	1.28	-0.36	-0.98	0.78	0.85	
Item 18	3.51	1.04	-0.46	-0.39	0.71	0.85	
Item 22	3.64	1.09	-0.66	-0.14	0.69	0.86	
Item 17	3.51	1.14	-0.32	-0.82	0.71	0.86	
Item 27	3.58	1.00	-0.42	-0.53	0.64	0.86	
Item 23	3.80	0.93	-0.82	0.58	0.58	0.87	
Item 24	3.75	0.98	-0.69	0.07	0.60	0.87	
Factor 2. Be supported							0.74
Item 29	3.95	0.81	-0.83	0.60	0.67	0.70	
Item 12	3.98	0.81	-0.94	1.11	0.67	0.70	
Item 33	3.84	0.87	-0.75	0.45	0.64	0.72	
Item 6	3.93	0.83	-0.82	0.71	0.70	0.69	
Item 1	3.91	0.72	-0.82	1.53	0.57	0.72	
Item 10	4.01	0.89	-0.97	0.95	0.71	0.69	
Factor 3. Be valued							0.70
Item 16	3.94	0.87	-0.96	0.95	0.68	0.66	
Item 30	3.97	0.91	-0.83	0.19	0.72	0.64	
Item 4	3.82	0.97	-0.78	0.19	0.77	0.59	
Item 32	3.97	0.87	-0.85	0.67	0.72	0.62	
Factor 4. Get sufficient information							0.60
Item 8	4.00	0.82	-0.75	0.31	0.74	0.47	
Item 34	3.91	0.90	-0.82	0.45	0.76	0.49	
Item 11	3.94	0.92	-0.95	0.72	0.74	0.54	
Factor 5. Trustfulness							0.64
Item 13	4.11	0.85	-0.99	0.89	0.78	0.49	
Item 9	3.95	0.88	-0.81	0.35	0.79	0.49	
Item 5	3.96	0.94	-0.98	0.80	0.74	0.66	
Factor 6. Be understood							0.63
Item 25	3.94	0.92	-0.77	0.21	0.71	0.56	
Item 14	4.01	0.85	-0.81	0.48	0.70	0.55	
Item 3	3.99	0.83	-0.67	0.12	0.65	0.59	
Item 7	3.94	0.89	-0.68	0.19	0.70	0.55	
Factor 7. Be respected							0.56
Item 26	3.76	0.91	-0.48	-0.34	0.79	0.32	
Item 28	4.03	0.86	-0.83	0.50	0.72	0.48	
Item 15	4.00	0.82	-0.84	0.54	0.68	0.54	
Factor 8. Be cared for							0.50
Item 2	3.99	0.83	-0.67	0.12	0.80	-	
Item 31	3.92	0.88	-0.82	0.37	0.83	-	

Table 5. Results of item analysis and reliability of the K-QONCS ($N=235$). K-QONCS, Korean version of the quality of oncology nursing care scale; SD, standard deviation; ITC, item-total correlation.

content validity of the K-QONCS was assessed using I-CVI, S-CVI/Ave, and S-CVI/UA. The high I-CVI values (≥ 0.8) obtained for each individual item indicate strong agreement among experts regarding the relevance and representativeness of the scale items. The S-CVI/Ave and S-CVI/UA values further confirmed the overall content validity of the K-QONCS. The S-CVI/Ave, exceeded the commonly recommended threshold of 0.90, indicating a high level of agreement among experts regarding the overall content validity of the scale. Additionally, the S-CVI/UA, which considers the proportion of items rated as content-valid by all experts, provides a more stringent assessment of content validity. While the S-CVI/UA value of 0.74 falls slightly below the ideal threshold of 0.80, it still indicates substantial agreement among experts regarding the content validity of the scale. By retaining all items without modification, the K-QONCS maintains its comprehensiveness and inclusivity, ensuring that it captures a broad range of dimensions relevant to the quality of oncology nursing care. Moreover, appropriate modifications were made to reflect the opinions of experts and address any concerns regarding item wording or

clarity. The comprehensive assessment of content validity in this study provides a solid foundation for the use of the K-QONCS in evaluating the quality of oncology nursing care in the South Korean context. Considering the strong content validity here, healthcare providers and researchers can rely on the K-QONCS as a valid and reliable tool for assessing and improving oncology nursing care quality.

EFA identified the underlying dimensions of the adapted scale, provided insights into the specific aspects of oncology nursing care being measured, and determined the key factors contributing to the overall quality perceived by patients. The KMO measure of sampling adequacy (0.88) and Bartlett's test of sphericity ($p < .001$) both indicated that the data were suitable for EFA. These findings suggested that the correlations among the items were sufficiently strong to support factor analysis. Additionally, the high communalities of most items indicated that the majority of items shared substantial variance with the underlying factors, supporting their inclusion in the analysis. The decision not to delete the only item with a communality slightly below 0.4 (item 5) was justified based on its proximity to the threshold and on the researchers' judgment.

The EFA further validated the underlying structure of the K-QONCS, revealing eight distinct factors related to different dimensions of oncology nursing care. Factors were named based on the items strongly loaded onto them and their conceptual themes. The original instrument¹⁴ consisted of five factors, whereas this study has eight factors. "Spiritual care" and "Sense of Belonging" from the original instrument were combined into one factor, and the four additional factors were "Get sufficient information", "Trustfulness", "Be understood", and "Be cared for". It was noteworthy that "Get sufficient information" emerged as a factor in that it was a factor that did not emerge in other studies that validated the instrument^{33–35}. This suggests that Korean cancer patients have a high information need for nursing care, supporting previous studies. In a previous study that identified unmet needs among South Korean esophageal cancer survivors, information was the most frequently mentioned domain³⁶. Also the domains with the highest levels of unmet need among Korean breast cancer survivors were information and education³⁷. Furthermore, a study on digital healthcare for Korean cancer patients found that there was a significant need for cancer education and information among these patients³⁸. This shows that information provision is an important factor in the care of Korean cancer patients, and this tool can be evaluated as an appropriate tool that takes into account the characteristics of the Korean population. "Be understood" can be seen as a reflection of Korean culture. As a collectivist culture where emotional suppression is seen as more adaptive³⁹, Koreans tend to shy away from direct and open emotional expression compared to Western cultures, which are more individualistic⁴⁰. This can lead to a tendency to implicitly expect the other person to understand rather than directly express their feelings, which may be related to the occurrence of this factor. The identification of these factors provides a comprehensive framework for understanding the multifaceted nature of oncology nursing care quality and informs targeted interventions to enhance patient experiences and outcomes. The explanatory power of each factor, as indicated by the percentage of variance explained, ranged from 3.80 to 13.75%. This variability in explanatory power underscores the heterogeneity of oncology nursing care quality and the multidimensional nature of the construct. Considering the unique contributions of each factor, healthcare providers can prioritize areas for improvement and tailor their interventions appropriately.

Clinically, the identification of distinct factors within the K-QONCS highlights the importance of addressing multiple dimensions of oncology nursing care quality according to patients' needs. Focusing on aspects, such as spiritual support, communication, and respect, can help healthcare providers deliver more holistic and patient-centered care. In research, the validated factor structure provides a reliable framework for assessing and comparing nursing care quality across different contexts and populations. Future studies may further explore the predictive validity of the scale factors in relation to patient outcomes and satisfaction. The EFA results have improved our understanding of oncology nursing care quality and provided a validated framework for assessing and improving care practices in our country.

The results of the MTMM matrix analysis demonstrated strong convergent validity, with correlation coefficients between the 34 items and their respective factors ranging from 0.57 to 0.83. These coefficients exceeded the commonly accepted threshold of 0.40, indicating that each item correlated strongly with its intended factor, supporting the scale's ability to measure the construct of interest consistently. For discriminant validity, the observed coefficients ranged from 0.10 to 0.50, indicating that the items had significantly lower correlations with unrelated factors, thus supporting the scale's ability to discriminate between related and unrelated constructs. Additionally, the correlations between the items and their corresponding factors were notably larger than those with other factors, further validating the distinctiveness of each factor and the discriminant validity of the scale overall.

Criterion validity, specifically discriminant validity, was further assessed by assessing the correlation of the K-QONCS scores with those of the Nursing Satisfaction Scale. The significant moderate correlation observed between the two scales ($r = .41, p < .001$) suggests a certain degree of overlap in the constructs being measured. However, the significantly lower correlations between each factor of the K-QONCS and the Nursing Satisfaction Scale provide evidence of discriminant validity, indicating that the K-QONCS measures distinct aspects of nursing care quality beyond overall satisfaction with nursing care.

The item analysis conducted on the K-QONCS provides valuable insights into the performance and reliability of individual items within the scale. Examining various statistical parameters can help assess the contribution of each item to the scale's overall reliability and validity. According to the mean scores of each item, the participants generally perceived a moderate to high level of oncology nursing care quality across all items. The narrow range of SDs (0.72–1.28) suggested that responses were relatively consistent and did not exhibit extreme variability. Similarly, the skewness and kurtosis values fell within an acceptable range, indicating that the distribution of responses for each item was approximately symmetrical and normally distributed, without any significant outliers or extreme values. The item-total correlation coefficients ranged from 0.57 to 0.79, indicating that all items correlated positively with the total score of the scale. Higher correlations indicate stronger associations between individual items and the underlying construct being measured. Clinically, healthcare providers can use

the K-QONCS to identify specific areas of strength and areas for improvement in oncology nursing care delivery. Also, nurses can use items with lower means or weaker correlations to enhance patients' overall care experiences. In research, the item analysis provides evidence of the scale's reliability and validity, supporting its use as a robust measurement tool in studies assessing oncology nursing care quality. Future research could further explore the psychometric properties of the K-QONCS. Additionally, qualitative research methods could be employed to gain a deeper understanding of patient perspectives on oncology nursing care quality. By employing rigorous psychometric analyses, researchers and healthcare providers can enhance the quality of care provided to cancer patients and contribute to the advancement of oncology nursing practice and research.

The high Cronbach's alpha coefficient of 0.92 for all items on the K-QONCS indicates high correlation between items and the reliability of the scale in assessing the quality of nursing care across a range of dimensions. Additionally, Cronbach's alpha coefficients ranged from 0.50 to 0.87 for each factor, further validating the reliability of the K-QONCS at the factor level. Although there were variations, all factors fell within an acceptable range, suggesting that each factor captures distinct yet internally consistent dimensions of oncology nursing care quality. Healthcare providers and researchers can confidently use the scale to identify areas for improvement, knowing that it yields consistent and stable measurements over time and across different patient populations. Additionally, the assessment of reliability at the factor level provides insights into the internal consistency of specific dimensions of care quality, guiding future research efforts aimed at understanding the multidimensional nature of oncology nursing care.

This study has some limitations. Convenience sampling was used, which might have limited the generalizability of the results. Although the survey was conducted through the Embrain survey platform, a professional online survey service, selection bias may still exist, as participation was voluntary and limited to individuals with access to online platforms. Additionally, as this study focused on patients currently undergoing cancer treatment, the results may not reflect the experiences of patients at different stages of cancer. To strengthen the utility and impact of the K-QONCS on oncology nursing practice, further studies with larger, more diverse sample populations and alternative recruitment strategies, such as randomized or stratified sampling, are warranted. Future research should also explore the scale's applicability across various healthcare settings and its association with patient outcomes to enhance its validity and broader relevance.

Conclusion

We developed a reliable and valid evaluation tool, tailored to assess the quality of oncology nursing care in the unique context of South Korea. By providing a standardized and validated measurement tool, we aim to raise awareness of the pivotal role of oncology nursing care and enhance understanding of the essential competencies required by oncology nurses to deliver high-quality care. The K-QONCS can potentially empower oncology nurses in tailoring their care approaches to meet the unique and evolving needs of patients with cancer, thereby contributing to the enhancement of their overall quality of life. Additionally, ongoing validation and refinement efforts will further strengthen the utility and reliability of the K-QONCS.

Data availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Author contributions

Hae Jeong An, Hye Young Min and Jungmin Lee conceived and designed the study. Hae Jeong An and Hye Young Min conducted the data collection. Hae Jeong An, Hye Young Min and Jungmin Lee conducted the data analysis. Hae Jeong An, Hye Young Min and Jungmin Lee interpreted the data. Hae Jeong An, Hye Young Min and Jungmin Lee wrote several drafts of the manuscript. Jungmin Lee critically reviewed the manuscript. All authors have read, revised and approved the manuscript.

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Declarations

Competing interests

The authors declare no competing interests.

Ethical approval

This study was approved by the Hallym University Institutional Review Board (HIRB-2023-028). Additionally, permission was obtained from the original authors to ensure ethical compliance and the proper adaptation of the tool.

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Consent to publish

All participants provided consent for the publication of anonymized data.

Additional information

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