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RESEARCH ARTICLE

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Development and psychometric evaluation of a quality nursing care scale from nurses' perspective

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Abstract

Aim: To develop and evaluate psychometric property of quality nursing care scale (QNCS) from nurses' perspective in the Chinese context.

Design: A cross-sectional survey design.

Methods: This study was conducted in two phases. In Phase I, literature review and interviews were conducted to develop the items. In Phase II, content validity was evaluated by five experts. Construct validity was tested through exploratory factor analysis (EFA) among 302 nurses and confirmatory factor analysis (CFA) among 510 nurses from October 2014 to January 2015. Additionally, internal consistency reliability was tested.

Results: The EFA extracted six factors including staff characteristics, task-oriented activities, human-oriented activities, physical environment, patient outcomes and precondition. All six factors accounted for 74.78% of the total variance to explain quality nursing care. The modified measurement model of the final version of QNCS was supported by the CFA with 48 items in six dimensions. The internal consistency reliability of final QNCS was acceptable.

KEYWORDS

instrument development, nurse, quality nursing care, reliability, validity

1 | INTRODUCTION

With the reconstruction of the healthcare system and cost-effective services, quality nursing care (QNC) has attracted increasing attention from managers worldwide (Karaca & Durna, 2019; Ryan et al., 2017). QNC refers to the degree of excellent nursing care provided to patients (Zhao, 2006). Nurses have a strong responsibility to provide QNC to patients in their daily work (Kim, 2020). The measures of QNC are generally assessed from the perspectives of nurses, patients or hospital managers. Among these, nurses' assessment of QNC is critical to improving the quality of nursing services (Cline et al., 2011). This is because nurses are the frontline care providers who assess, plan and evaluate patients' requirements; advocate for patients; administer proper medication and treatment to

patients; and ensure patients' comfort (Burhans & Alligood, 2010). Nurses' assessment of QNC not only helps them recognize how to properly treat patients (Ding & Jiang, 2013) but also assists hospital managers in identifying hazards, preventing errors and minimizing possible harm to the patients (Rashvand et al., 2017). The literature review revealed that QNC from nurses' perspective has a significantly negative influence on medication error and patient falls (MacDavitt, 2008; Sochalski, 2001); nosocomial infection, wrong dose or medication, or length of hospitalization (Lucero, 2008; Sochalski, 2001); and failure to rescue and mortality rate (McHugh & Stimpfel, 2012). Moreover, QNC from nurses' perspective also positively influenced adverse patient events (Mallidou et al., 2011).

Ryan et al. (2017) conducted a systematic review and found that, although nurse-assessed QNC is important, few studies have evaluated QNC from the nurses' perspective. Additionally, there is no nurse-assessed QNC scale that has been developed in the context of the Chinese healthcare system. Therefore, it is vital to develop a quality nursing care scale (QNCS) from nurses' perspective in order to be applicable in the context of the Chinese hospitals.

2 | BACKGROUND

By conducting a critical analysis of literature related to QNC, few studies have examined QNC from nurses' perspective (Burhans & Alligood, 2010; Ryan et al., 2017). If current quality and outcome measures are unable to capture the meaning of QNC from the perspective of clinical nurses, this can lead to slow quality improvement (Burhans & Alligood, 2010). Thus, evaluating QNC from the nurses' perspective is essential. The existing instruments to assess QNC from the nurses' perspective are described below.

The Good Perioperative Nursing Care Scale (GPNCS) is a popular instrument that is used to assess QNC from nurses' perspective. Leino-Kilpi (1992) initially developed the components of good nursing care in Finland and identified the following components: environment, characteristics of actors, nursing actions, proceeding of the process, patient management strategies, collaboration with family members or others, and preconditions of care. Later on, the GPNCS has been adapted into the Chinese, Turkish and Lithuanian versions. Zhao (2006) adapted the GPNCS into China, which contained six dimensions and 63 items. The dimensions included cooperation with relatives, physical environment, preconditions of care, care-related activities, nursing process's progress and staff characteristics. The content validity was 0.91, and the internal consistency reliability (ICR) was 0.84. The construct validity was not examined. Donmez and Ozbayır (2011) adapted the GPNCS into Turkey. It included 32 items in seven dimensions (environment, personnel characteristics, respect, support, nursing process, giving information and physical care). The ICR was 0.94. Istomina et al. (2012) adapted GPNCS to Lithuania, and seven dimensions were extracted from the factor analysis, including cooperation with relatives, activities, staff characteristics, preconditions and environment, progress of the nursing process, task-oriented activities, advocacy and preconditions. The ICR was 0.863. Stolt et al. (2019) conducted a Rasch analysis among 167 nurses in Finland. They identified seven categories, which are the same as those reported in the study of Leino-Kilpi (1992). The ICR was 0.88. Although the GPNCS was tested in various countries, it was developed a long time ago. Therefore, it may not reflect current patients' needs with the contemporary healthcare system reform (Stolt et al., 2019).

Meanwhile, Parasuraman et al. (1988) developed Service Quality Scale (SERQUAL) to measure the quality of service from the customers' perspective. More recently, Lee and Yom (2007) modified SERQUAL's items and applied it to measure hospital nurses' perspective of QNC. The authors tested the modified SERQUAL's psychometric among 300 Korean nurses and identified five factors, namely, tangibility, responsiveness, empathy, assurance and reliability. The ICR was 0.97. However, SERQUAL was not developed with the purpose of measuring QNC service; hence, it cannot fully reflect the construct of QNC.

Since 2000, another popularly used scale to measure QNC is the Aiken et al. (2002) single-item scale. This scale was used by You et al. (2013) in China and Europe and by Laschinger et al. (2014) in Ontario. However, the single-item scale was unable to reveal the constructs of the related concepts; moreover, these kinds of scales lacked validity and reliability (DeVellis, 2012).

Overall, the existing instruments to measure QNC have their distinct limitations. Stolt et al. (2019) mentioned that the instruments should be updated and the related concepts accompanying change in the healthcare system should be assessed. Additionally, Gasparino and Guirardello (2009) stated that the development of new measurement should consider the different cultural backgrounds and healthcare values of the intended users. Thus, a new instrument must be developed to assess QNC based on the contemporary hospital healthcare context and culture in China. In relation to this, the aim of this study was to develop a new instrument to assess QNC within the contemporary Chinese hospitals context and test the psychometric properties of the developed scale.

2.1 | Theoretical framework

The Donabedian's (1988) quality of care assessment model is popularly used to evaluate quality in the clinical settings. This model is used as the theoretical framework in the current research. Donabedian's (1988) model included three components: structure, process and outcome. The structures refer to human resources, material resources and organizational structure. The processes refer to staff's activities to diagnose diseases and to recommend or implement treatment. The outcome concluded the specific clinical results of patient care.

3 | METHODS

3.1 | Design

This cross-sectional survey study was developed into two phases to develop and assess psychometrical properties of QNCS. In phase

I, researcher developed item pools through literature review and experts' interviews with five Chinese nurses. In phase II, the psychometric properties of validity and reliability were tested including three steps (Figure 1).

3.1.1 | Phase I: The instrument development

Step 1: the QNCS's constructs and definition were emerged from literature review and experts' interviews in this step. Firstly, the researcher reviewed and synthesized literature described the components of QNC. The key words of "quality nursing care" and "nurse perspective" or "nurse assessment" or "nurse-assessed" were used to search related articles in English through the database of Web of Science, Scopus, Science Direct, CINAHL and Google Scholar. Through critically synthesizing, eight components were identified: physical environment; nurse staffing; precondition; staff characteristic; timeless activities; human-oriented activities (i.e. respect, psychological support and empathy); patient outcomes (i.e. patient satisfaction and patient needs); and task-oriented activities (i.e. give information, provide health education and perform physical care). Second, the purposively selected five nursing experts who possessed sufficient understanding of QNC were interviewed to describe the construct of QNC in the contemporary hospital context in China (Waltz et al., 2010). These nurses met the following criteria: they were Registered Nurses () with working experience of over 20 years, () having a professional position that was higher than associate professor and () familiar with the QNC concept.

There were two interview questions: () How do you explain QNC from nurses' perspective? And () how do you consider the components of QNC? The data were collected using a paper, pencil and audio recorder. The process continued until data saturation was reached. The data were analysed through content analysis, which generated eight themes. These themes were similar to those identified in the literature review, apart from the components of "task-oriented activities" added the content of "do a right thing" and the components of "patient outcomes" added the content of "patient safety."

Given that several research works have already reported that nurse staffing was a vital factor influencing QNC (Liu & Aungsuroch, 2018), this component was omitted in the present study. By integrating the results of the literature and the interview with experts, we identified the initial 48-item QNCS with seven dimensions: staff characteristics (items), physical environment (items), precondition (items), human-oriented activities (items), task-oriented activities (11 items), patient outcomes (items) and timeless activities (items). A total of 27 items were identified from the literature review and another 21 items were generated from the interviews.

Additionally, in step 1, through literature review and interviews with the nursing experts, QNC was defined as the level of good nursing care services provided to patients, which met patients' needs and satisfied patients' demands.

The Chinese version of the QNCS was a 5-point Likert-type instrument. It was used to assess QNC from the nurses' perspective with the rating score of 5 indicating "strongly agree" and 1 indicating "strongly disagree." A higher response score indicated higher QNC, and a lower response score indicated lower QNC.

3.1.2 | Phase II: Testing the psychometric properties of QNCS

Step 2: Content validity testing

The content validity of the 48 items in the QNCS was assessed by five nursing experts. They met the following inclusion criteria: () holder of a master's degree or teaching graduate students, () holder of an associate professor or higher professional position and () teaching administration courses or working at administration positions. These experts evaluated the relevance of each item to the constructs based on the four-point Likert-style scale with the following ratings: 4 = very relevant, 3 = quite relevant, 2 = somewhat relevant and 1 = not relevant (Polit & Beck, 2012). The content validity index (CVI) refers to the ratio of items graded as very or quite relevant by all of the raters involved (Polit & Beck, 2012). According to Polit et al. (2007), the acceptable CVI of items (I-CVI) evaluated by five experts and the average of CVI (S-CVI/Ave) were equal or more than 0.8 and 0.9, respectively.

Step 3: Factor analysis through exploratory factor analysis (EFA)

Determining the construct validity by the EFA can identify the number of latent variables in a group of items (DeVellis, 2012). Thus, QNCS was initially testing through EFA. The Cronbach's α was used as a measure of the internal consistency reliability (ICR) of QNCS.

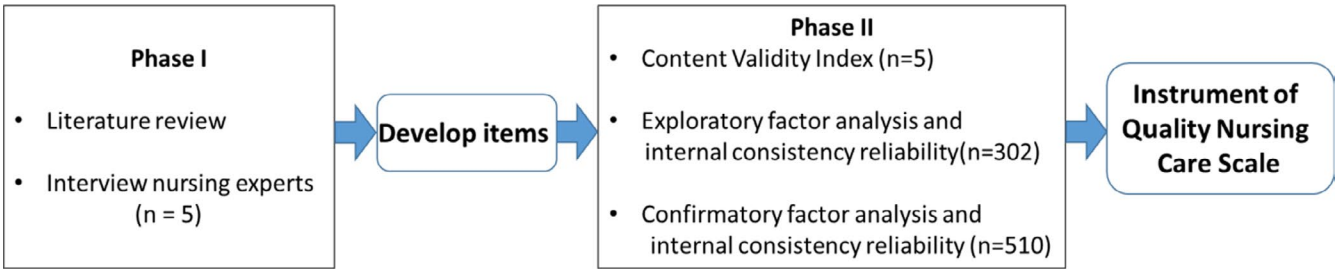

FIGURE 1 The progress of quality nursing care scale development and psychometric property testing

Step 4: Factor analysis through confirmatory factor analysis (CFA)

The aim of performing the CFA was to confirm that the structures of the QNCS are predicted by the theory and previous empirical results (DeVellis, 2012). Thus, the final version of QNCS was tested through CFA with another group of participants. The ICR of final QNCS was examined using Cronbach's α.

3.2 | Participants' description

In general, item to participants' ratio ranged from 510 times for construct validity testing (Zhu et al., 2019). Considering a drop-out of samples, 10% attrition rate was added. Thus, with 48 items of QNCS, the sample size of 264 to 528 was considered to be acceptable.

In the EFA progress, the construct validity of the initial QNCS was tested among 302 nurses by stratified random sampling. As suggested by Comrey (1973), a sample of 300 participants was considered a good number to test the construct validity of the scale. Considering the loss of sample size, 10% of participants were added. Thus, a total of 330 participants were required. The inclusion criteria were as follows: Registered Nurses () who worked at a Chinese tertiary general hospital for at least months and () who directly provided nursing care services to people admitted in the hospitals' inpatient departments. The exclusion criteria were as follows: those who () held a management position and () worked as office nurses, computer response nurses or dressing room nurses.

In the CFA progress, as suggested by Waltz et al. (2010), the sample size of more than 500 is required for conducting CFA. Additionally, considering the loss of participants, 10% of the sample size was added. Thus, a total of 550 nurses were required. A multistage random sampling strategy was performed to recruit nurses from four tertiary general hospitals, which are located in the northwest, northeast, south centre and southwest regions of China. Nurses' exclusion and inclusion criteria were the same as those in the EFA progress.

3.3 | Statistical analysis

IBM SPSS 22 program was used to describe the percentages, frequencies, means and standard deviations (*SD*) of the participants. The SPSS program was also used to test the factor structures of the QNCS through the EFA. The instruments' item to total correlation ($p < .05$) and ICR were used for item analysis before running the EFA. In accordance with Hair et al. (2010), eigenvalues more than one and scree plots were used to identify the factors. The item factor loadings' cut-off point was set as 0.4 to recruit the items. The Cronbach's α of more than 0.8 was used to determine the ICR of the QNCS.

The LISREL 8.72 program was run to test the factor structures of the QNCS through the CFA. Before running the CFA, the multicollinearity, linearity and normality were tested through the SPSS program. The criteria applied by Hair et al. (2010) was used to evaluate the measurement model fit with research data including $\chi^2/df < 2.00$, $p \geq .05$, adjusted goodness-of-fit index (AGFI) >0.90, goodness-of-fit index (GFI) >0.90, normed fit index (NFI) >0.90, standardized root-mean-square residual (SRMR) <0.07 and root-mean-square error of approximation (RMSEA) <0.08. With the sample size more than 500, it was appropriate to set up the cut-off factor loading of items above 0.3 with significant *T*-value above 1.96 ($\alpha = 0.05$; Hair et al., 2010).

3.4 | Ethical considerations

This study was accepted by Ethical Review Committee for Human Research of Health Sciences of the researcher's affiliated organization. The researcher received the data collection's permissions from each hospital. Additionally, all the participants signed informational consent forms.

3.5 | Data collection

The procedure of data collection included the following: () the research assistants in each hospital received the training on proper data collection from the researcher, including participants' inclusion and exclusion criteria and sampling techniques; () the researcher and assistants provided the informed consent form, information sheet and package of questionnaires to the nurses; () the researcher and assistants went to clinical wards and collected the questionnaires; and () the researcher checked whether the questionnaires were completely answered. Data for the EFA were collected from October to December 2014. Data for the CFA were collected on the month of January 2015. The participants in the CFA progress were totally different from those in the EFA progress.

4 | RESULTS

4.1 | The participants' characteristics

In the EFA progress, after deleting 28 questionnaires with incomplete answers, the remaining 302 questionnaires were used for data analysis (91.52% response rate). The nurses' ages were between 2152 years (mean:28.05, *SD*:5.35). In the CFA progress, 56 incomplete or declined questionnaires were excluded. Thus, 510 questionnaires were used (90.11% response rate) to report the results. The nurses' ages ranged from 2154 years (average age: 31.2 years, *SD*: 6.3). The detailed information is presented in Table 1.

4.2 | Validity testing of the QNCS

4.2.1 | Content validity

In this research, the I-CVI of QNCS ranged between 0.81. The S-CVI/Ave was 0.98. Both I-CVI and S-CVI/Ave met the criteria

TABLE 1 Demographic characteristics of participants

Characteristics	EFA (*N* = 302)		CFA (*N* = 510)	
	Frequency	Percentage	Frequency	Percentage
Age (years)				
≥50	2	0.7	4	0.8
40–49	13	4.3	59	11.5
30–39	71	23.5	187	36.7
20–29	216	71.5	260	51.0
Gender				
Female	302	100.0	506	99.2
Male	0	0.0	4	0.8
Education				
Master degree	0	0.0	6	1.2
Bachelor degree	150	49.7	321	62.9
Associate degree	119	39.4	156	30.6
Secondary technical	33	10.9	27	5.3
Work experience (years)				
>30	0	0.0	2	0.4
26–30	0	0.0	9	1.8
21–25	6	2.0	41	8.0
16–20	21	7.0	48	9.4
11–15	20	6.6	51	10.0
5–10	69	22.8	162	31.8
<5	186	61.6	197	38.6
Employment status				
Contract	243	80.5	388	76.1
Permanent	59	19.5	122	23.9
Work departments				
EENT	6	2.0	22	4.3
ICU	16	5.3	80	15.7
Paediatric	14	4.6	24	4.7
OBGYN	11	3.6	40	7.8
Medical	154	51.0	187	36.7
Surgical	101	33.5	157	30.8

Abbreviations: CFA, confirmatory factor analysis; EENT, eye, ear, nose and throat department; EFA, exploratory factor analysis; ICU, intensive care unit; OBGYN, gynaecology and obstetrics department.

suggested by Polit et al. (2007). Thus, QNCS had satisfied content validity. Additionally, the wording of some items was revised base on experts' comments.

4.2.2 | Construct validity

Testing through the EFA

Before conducting EFA in the current study, the items were analysed. The item to total correlations of the QNCS ranged between 0.620.85 and was higher than 0.3 (p <.05Polit & Beck, 2012). The ICR values of the seven dimensions of the initial QNCS ranged between 0.910.95 and were higher than 0.7 (Polit & Beck, 2012). Thus, it was appropriate to run the EFA.

When the EFA was conducted, the result of Bartlett's test was $\chi^2 = 16{,}194.93$, p <.001 and that of the Kaiser–Meyer–Olkin (KMO) test was 0.97, indicating an adequate sample size for performing EFA. The principal axis method of factor extraction with varimax rotation was used to run the EFA (Hair et al., 2010). A total of six factors were extracted with the eigenvalues ranging between 1.0028.47 (Table 2). These factors included staff characteristics, task-oriented activities, human-oriented activities, physical environment, patient outcomes and precondition. The scree plot illustrated a possible break at the sixth factors. These factors explained 74.78%

of the cumulative variance. The factor loadings of the items ranged from 0.400.81, as shown in (Table 3). Based on Donabedian's (1988) model and the experts' suggestion, three items were considered to move from the first-order factor to the next lower factor, because the first-order factor does not make senses when one reads the item meaning. For example, item #38 (I protect patient's privacy when providing nursing service) was moved from the dimension of "staff characteristic" to "human oriented activities." Item #21 (I intend to help patients whenever the help is needed) was moved from "physical environment" to "precondition." Item #43 (I ensure that the provided service would meet patient's satisfaction criteria) was moved from the "human oriented activities" to "patient outcomes."

Testing through the CFA

Before running CFA, three assumptions had been tested with acceptable results. The maximum-likelihood estimation method was performed to run the CFA. The finding showed that the modified QNCS consisted of six dimensions with 48 items (Figure 2). The modified model's GFI indicators were achieved (χ^2/df = 1.08, p =.054, GFI = 0.93, AGFI = 0.90, NFI = 0.99, RMSEA = 0.01 and SRMR = 0.03). The item's standardized factor loadings were between 0.520.83 (p <.05Table 4).

4.3 | Reliability testing of the QNCS

In step 3 of the EFA, the ICR of Cronbach's α ranged from 0.830.97 in each dimension (Table 3). The Cronbach's α of the overall scale was 0.98.

In step 4 of the CFA, the overall Cronbach's α of the final scale was 0.97 with all dimensions ranged from 0.850.95 (Table 5). Thus, the final QNCS had an acceptable ICR.

5 | DISCUSSION

This study developed a QNCS from the nurses' perspective within the Chinese contemporary hospital context and evaluated the psychometric properties of the developed scale. To the best of our knowledge, this is the first QNCS developed from the nurses' perspective in China based on the Donabedian's (1988) model. The items were generated from the results of a literature review combined with those generated from interviews with nursing experts to ensure that the resulting QNCS would better reflect the changing nursing care environment in China. The steps of content validity testing, EFA, CFA and reliability testing were performed to evaluate the QNCS; and the results indicated that the developed scale had good reliability and validity with 48 items in six dimensions. Content validity is an important type of validity considered in instrument psychometric testing. This is because content validity testing aims to evaluate whether an instrument's items can adequately illustrate the constructs of particular interest (Crocker & Algina, 1986). The I-CVI and S-CVI/Ave of the QNCS were equal or higher than 0.8 and 0.9, thus meeting the acceptable criteria (Polit et al., 2007).

Before conducting EFA, the item to total correlation of the initial QNCS ranged from 0.620.85, which was higher than 0.3 (Polit & Beck, 2012) and not more than 0.85 (Polit, 2010). The result of the KMO test was more than 0.7 and that of the Bartlett's test (p <.05); thus, 302 participants were an adequate number to conduct the EFA (Leech et al., 2005). Although various extraction and rotation methods can be selected in the EFA, the researchers should carefully select strategies to perform factor analysis consistent with the research aims in a rational explanation (Lee & Clarke, 2015). In this study, the patterns of extracted factors were supported by the Donabedian's (1988) model and deemed meaningful through experts' review. Six factors explained 74.78% of the total variance, which exceeded 60% as recommended by Hair et al. (2010); thus, enough factors were extracted. The ICR was higher than 0.8 as suggested by Polit and Beck (2012). Thus, the initial QNCS had acceptable validity and reliability.

The final modified QNCS was supported by the research data from the results of the CFA with another group of participants. Thus, the six dimensions of the final QNCS had good construct validity. The ICR of final QNCS was also good with a score higher than 0.8 (Polit & Beck, 2012). Each dimension is described below.

The dimension "physical environment" refers to nurses' provision of a safe, comfortable, clean and a peaceful ward atmosphere to the patients. This component is consistent with those included in previous studies (Donmez & Ozbayır, 2011; Zhao, 2006). A good hospital

TABLE 2 The initial Version of Quality Nursing Care Scale description (N = 302)

Dimension	Eigen value	Percent of variance explained	Number of items	Cronbach's α
Factor 1 task-oriented activities	28.47	59.31	14	0.97
Factor 2 staff characteristic	2.36	4.91	8	0.95
Factor 3 physical environment	1.68	3.49	6	0.83
Factor 4 human-oriented activities	1.33	2.77	7	0.94
Factor 5 precondition	1.07	2.22	7	0.93
Factor 6 patient outcomes	1.00	2.09	6	0.89
Initial QNCS		74.78	48	0.98

Abbreviation: QNCS, quality of nursing care scale.

TABLE 3 Factor loading and components of initial Quality Nursing Care Scale ($N = 302$)

Items	Components					
	1	2	3	4	5	6
Factor 1: task-oriented activities (14 items)						
29. I can clearly explain to the patients about their questions related to medical expense	0.69					
30. I provide guidance to do self-care for my patients	0.66					
28. I provide the information to patient with effective communication	0.63					
27. I provide sufficient information related to nursing care to patients' relatives	0.62					
34. I perform the standardized nursing service to patient according to their situation	0.61					
26. I inform my patients before providing any nursing intervention	0.60					
31. I perform the good basic nursing care to patients	0.59					
33. I perform nursing duties in a professional manner	0.59					
25. I provide sufficient information to my patients about their care or treatment with clear word	0.55					
24. I immediately response to patient and family's problems	0.55					
32. I provide individualized care for patients	0.54					
23. I provide medication and treatment at the correct time	0.44					
35. I provide effective health education to patients	0.43					
22. Although I am busy, I provide nurse service on time	0.40					
Factor 2: staff characteristic(8 items)						
7. I carefully follow hospital rules and regulations		0.74				
6. I am very cautious in performing my nursing duties		0.70				
9. I am polite and pleasant to treat patient		0.66				
10. I smile to patients when providing nursing service		0.61				
8. I closely observe the patient condition, focusing on the dynamic change of the disease		0.60				
11. I patiently listen to my patients, when they want to talk about their problems		0.56				
13. I work well with my team (other nurses and healthcare providers)		0.52				
12. I patiently and repeatedly explain patients doubt		0.43				
Factor 3 physical environment(6 items)						
1. I provide the hygienic room to the patients			0.77			
2. I provide a comfortable environment for patient to rest in			0.81			
3. I keep patient room has the good ventilation			0.80			
4. I provide safe environment to patients for their treatment			0.79			
5. I provide the quiet ward environment for patients staying in the hospital			0.76			

(Continues)

TABLE 3 (Continued)

Items	Components					
	1	2	3	4	5	6
20. I can immediately dispose patients' reflection environment problems			0.43			
Factor 4 human-oriented activities(7 items)						
41. I help my patients to relive their worry about illness				0.71		
39. I can help patients build confidence to overcome the disease				0.63		
42. I ensure to provide services that would meet patient individual needs				0.57		
37. I provide humanity services to patients based on their characteristics				0.55		
40. I help my patients to relieve their fear about treatment and procedure				0.54		
36. I can analyze the patient psychological feelings to provide care				0.48		
38. I protect patient's privacy when provide nursing service				0.43		
Factor 5: precondition(7 items)						
15. I master the clinical technical operations to meet the needs of nursing care					0.72	
14. I can up-to-data my theoretical knowledge to meet the needs of nursing care					0.72	
16. I master operating process of basic nursing care and special nursing care					0.56	
19. I can manage drugs well					0.53	
18. I participate in the ward quality management					0.52	
17. My professional experience is helpful for my nursing job					0.46	
21. I intend to help patients whenever the help is needed					0.41	
Factor 6: patient outcomes (6 items)						
45. I ensure to provide safety service to patient						0.60
46. I can avoid patient physical damage (such as fall, burn, and pressure sore)						0.59
44. I never get complains from the patients and their relatives						0.56
47. I can avoid patient chemical damage (such as drug misuse, drug incompatibility, wrong medication)						0.55
48. I can avoid patient biological damage (such as bacterium, virus, and fungus infection)						0.54
43. I ensure that the provided service would meet patient's satisfaction criteria						0.40

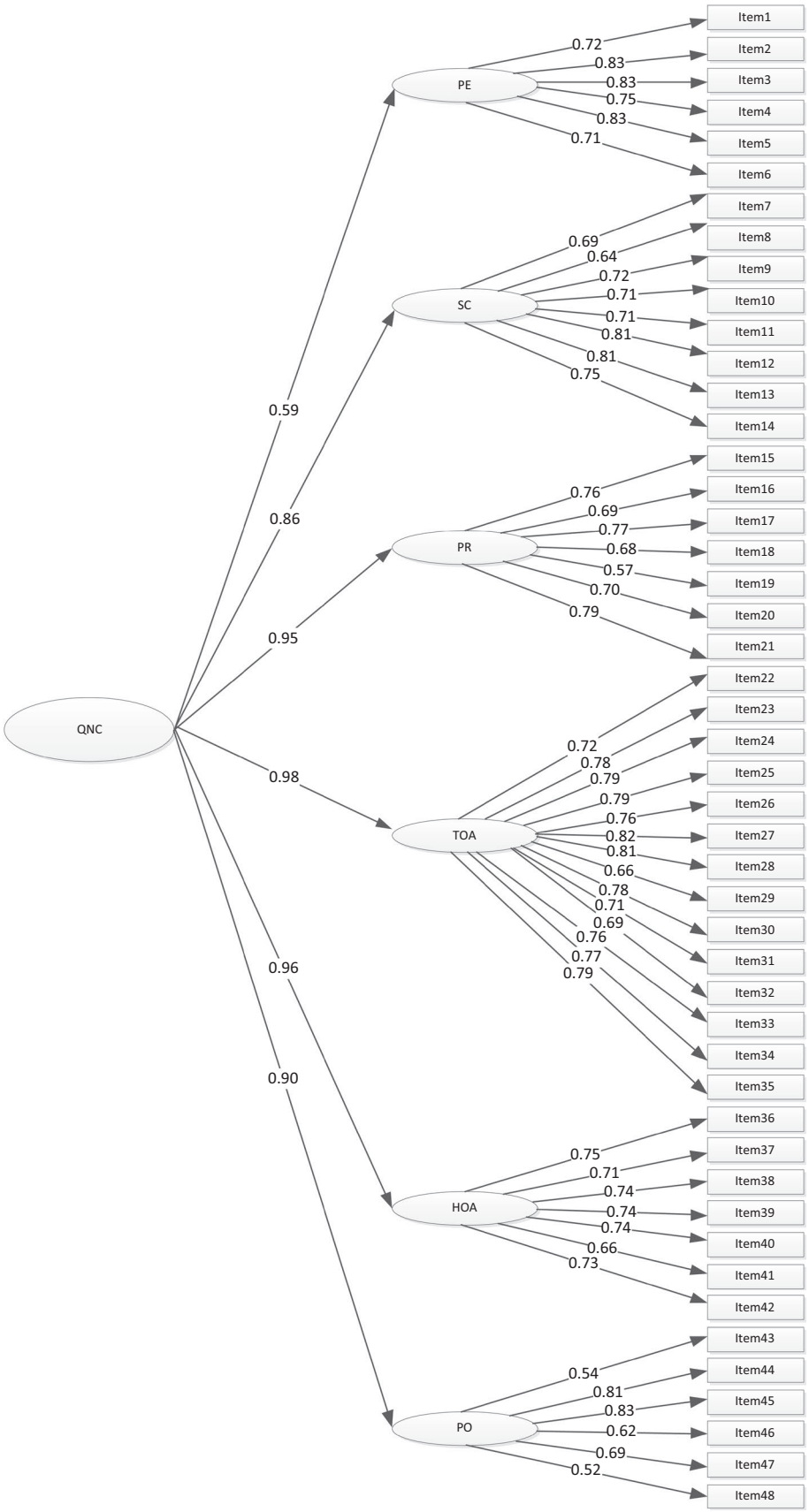

FIGURE 2 Measurement model of Quality of Nursing Care Scale (QNCS). *Note*. QNC, quality of nursing care; PE, physical environment; SC, staff characteristic; PR, precondition; TOA, task-orientated activities; HOA, human-orientated activities; PO, patient outcomes; RMSEA, root-mean-square error of approximation

TABLE 4 Item's description and factor loading of final quality nursing care scale ($N = 510$)

Quality nursing care of latent constructs	*b*	*B*	SE	*t*-value	R^2	Error
1. Physical environment (6 items)	0.39	0.58	0.04	11.09*	0.33	0.67
Item 1. I provide the hygienic room to the patients	1.00	0.69			0.47	0.53
Item 2. I provide a comfortable environment for patient to rest in	1.15	0.79	0.05	24.70*	0.62	0.38
Item 3. I keep patient room has the good ventilation	1.16	0.79	0.06	18.32*	0.62	0.38
Item 4. I provide safe environment to patients for their treatment	1.15	0.79	0.07	16.00*	0.62	0.38
Item 5. I provide the quiet ward environment for patients staying in the hospital	1.25	0.86	0.07	16.99*	0.75	0.25
Item 6. I can immediately dispose patients' reflection environment problems	1.03	0.70	0.07	14.53*	0.49	0.51
2. Staff characteristic (8 items)	0.55	0.77	0.04	14.70*	0.60	0.40
Item 7. I am very cautious in performing my nursing duties	1.00	0.72			0.52	0.48
Item 8. I carefully follow hospital rules and regulations	1.00	0.72	0.04	24.93*	0.51	0.49
Item 9. I closely observe the patient condition, focusing on the dynamic change of the disease	1.17	0.85	0.07	16.05*	0.72	0.28
Item 10. I am polite and pleasant to treat patients	0.99	0.71	0.06	16.88*	0.50	0.50
Item 11. I smile to patients when providing nursing service	1.05	0.75	0.07	15.73*	0.56	0.44
Item 12. I patiently listen to my patients, when they want to talk about their problems	1.12	0.80	0.07	19.94*	0.64	0.36
Item 13. I patiently and repeatedly explain patients doubt	1.24	0.88	0.08	16.26*	0.78	0.22
Item 14. I work well with my team (other nurses and healthcare providers)	1.09	0.78	0.07	16.15*	0.61	0.39
3. precondition (7 items)	0.74	0.94	0.04	19.12*	0.89	0.11
Item 15. I can up-to-data my theoretical knowledge to meet the needs of nursing care	1.00	0.78			0.61	0.39
Item 16. I master the clinical technical operations to meet the needs of nursing care	0.88	0.69	0.05	16.89*	0.47	0.53
Item 17. I master operating process of basic nursing care and special nursing care	0.97	0.76	0.05	17.69*	0.58	0.42
Item 18. My professional experience is helpful for my nursing job	0.83	0.65	0.06	14.12*	0.43	0.57
Item 19. I participate in the ward quality management	0.71	0.56	0.06	12.55*	0.31	0.69
Item 20. I can manage drugs well	0.88	0.69	0.06	14.84*	0.48	0.52
Item 21. I intend to help patients whenever the help is needed	1.00	0.78	0.06	17.05*	0.61	0.39
4. task-oriented activities (6 items)	0.81	0.98	0.04	21.90*	0.97	0.03

(Continues)

TABLE 4 (Continued)

Quality nursing care of latent constructs	*b*	*B*	SE	*t*-value	R^2	Error
Item 27. I provide sufficient information related to nursing care to patients' relatives	1.00	0.82			0.68	0.32
Item 29. I can explain clearly to the patients about their questions related to medical expense related to nursing care	0.82	0.68	0.05	17.61*	0.46	0.54
Item 30. I provide guidance to do self-care for my patients	0.92	0.76	0.05	19.53*	0.58	0.42
Item 31. I perform the good basic nursing care to patients	0.86	0.71	0.05	17.76*	0.50	0.50
Item 32. I provide individualized care for patients	0.84	0.70	0.05	16.44*	0.49	0.51
Item 35. I provide effective health education for patients	0.98	0.81	0.05	20.31*	0.65	0.35
5. human-oriented activities (5 items)	0.73	0.97	0.04	18.93*	0.95	0.05
Item 36. I can analyze the patient psychological feelings to provide care	1.00	0.75			0.57	0.43
Item 38. I provide humanity services to patients based on their characteristics	0.96	0.72	0.05	16.45*	0.52	0.48
Item 39. I can help patients build confidence to overcome the disease	0.97	0.74	0.05	17.82*	0.54	0.46
Item 40. I help my patients to relieve their fear about treatment and procedure	1.00	0.75	0.06	17.14*	0.56	0.44
Item 41. I help my patients to relieve their worry about illness	0.88	0.67	0.05	16.20*	0.44	0.56
6. patient outcomes (6 items)	0.50	0.89	0.04	12.30*	0.80	0.20
Item 43. I have never get complains from the patients and their relatives	1.00	0.56			0.31	0.69
Item 44. I ensure to provide service would meet patient's satisfaction criteria	1.43	0.81	0.11	13.49*	0.65	0.35
Item 45. I ensure to provide safety service to patient	1.48	0.83	0.12	12.77*	0.69	0.31
Item 46. I can avoid patient physical damage (such as fall, burn, and pressure sore)	1.13	0.63	0.10	10.92*	0.40	0.60
Item 47. I can avoid patient chemical damage (such as drug misuse, drug incompatibility, and wrong medication)	1.25	0.70	0.11	11.61*	0.49	0.51
Item 48. I can avoid patient biological damage (such as bacterium, virus, and fungus infection)	0.94	0.52	0.10	9.49*	0.27	0.73

*$p < .05$.

TABLE 5 Internal consistency reliability of final Quality Nursing Care Scale ($N = 510$)

Dimensions	Cronbach's α
Physical environment	0.88
Staff characteristic	0.88
Precondition	0.88
Task-oriented activities	0.95
Human-oriented activities	0.91
Patient outcomes	0.85
Total score	0.97

environment can ensure patients' safety and shorten recovery time among patients with a good emotional response. The importance of a good patient admission environment has been recognized since the era of Florence Nightingale, which is also vital to the current healthcare system in China.

The dimension "staff characteristics" refers to nurses being cautious, careful, friendly, patient and upholds team spirit to provide nursing service. The name of this dimension is similar to other components in previous instruments (Donmez & Ozbayır, 2011; Zhao, 2006). However, this study added new items related to nurses' characteristics of cautiousness, patience and friendliness. For example, the items of "I patiently and repeatedly explain patients' doubt," "I patiently listen to my patients, when they want to talk about their problems," and "I smile to patients when providing nursing service" were generated from nursing experts' interview. This is because the nature of nursing care cannot accept any mistakes. Thus, it is important to clarify patients' question or doubt. Additionally, an increasing number of elderly patients are being admitted to hospitals globally. Thus, nurses must have enough patience to deal with such patients. Moreover, when nurses smile to patients, it may make patients joyous, which can ultimately help them feel good and recover from their illnesses.

The dimension "precondition" indicates that QNC can be achieved if nurses have practice skills, up-to-date knowledge, experience and participation. This dimension was also mentioned by Zhao (2006). Valizadeh et al. (2018) explored good QNC from clinical nurses' perspective through a qualitative study. They found that up-to-date knowledge and skilful practices are important in ensuring safety and the provision of best health care. Additionally, in the current study, the researcher added nurses' participation in quality management to ensure that nurses recognize their important role in improving QNC. Nowadays, quality control circle is popularly used in Chinese clinical wards, which gives the opportunity for clinical nurses to participate (Qi, 2018). Moreover, the contents of "master nursing process" and "manage drugs well" were also added in this scale, which are required nurses' clinical skills and knowledge to work in Chinese contemporary hospitals.

The dimension "task-oriented activities" refers to nurses providing appropriate information, communication, right nursing care, and health education to patients, and willing to provide service as soon as possible. Although this dimension was named by Istomina et al. (2011) and Leino-Kilpi (1992), the contents of doing the right things and readiness to provide the services as soon as possible were combined in this dimension to update the nurses task-oriented activities fit with the contemporary healthcare system of the Chinese hospitals. Moreover, Valizadeh et al. (2018) found that nurse–patient communication is the core foundation upon which to create an effective clinical therapeutic relationship. However, how to measure the activities in communication were not found in the previous quality nursing care instrument. Thus, in this study, the researchers made the activities in communication can be measured from nurses' perspective. For example, the item of "I can clearly explain to the patients about their questions related to medical expense" was added in QNCS. Furthermore, with the implementation of "high-quality nursing services" program in the Chinese hospitals in 2011, the contents of the basic nursing care, individualized and situational nursing care, and patients' education are more emphasized than in previous Chinese healthcare system (Ministry of Health of China, 2010). Thus, the items of "I perform the good basic nursing care to patients," "I provide individualized care for patients," and "I provide effective health education to patients" were added into the task-oriented activities to reflect the contemporary healthcare reforms in the Chinese hospitals.

The dimension "human-oriented activities" refers to nurses being empathetic and showing respect, encouragement and psychological support to the patients. According to Valizadeh et al. (2018), holistic care should consider patients' spirit, emotion, background and religion; it was recognized as optimal care. Additionally, various researchers also reflected nurses' value of empathy or respect, which were considered as good QNC (Lee & Yom, 2007; Ryan et al., 2017; Valizadeh et al., 2018). The QNCS developed in the current study focused more on providing psychological support to patients to help them overcome the disease through their internal motivation, which also supports the mission of Chinese "high-quality nursing services" program (Ministry of Health of China, 2010). Moreover, Andersson et al. (2020) also mentioned that the humanity aspects of nursing care are important when nurses provided oral care.

The dimension "patient outcomes" refers to the results of the nursing care that meets patients' needs, satisfaction and safety requirements. Although this dimension exists in Hogston (1995), it was lack of items to measure the patient outcomes (You et al., 2013; Zhao, 2006). Ryan et al. (2017) also conducted a qualitative study and pointed out that QNC should consider the positive outcomes achieved by nurses. In this study, the researcher made the dimension of the patient outcomes to be measurable in QNCS. Additionally, the researcher added patient safety to measure QNC in the current Chinese healthcare system. This content matched with the World Health Organization's (2020) statement that ensuring patient safety is an important achievement in improving quality of care. Additionally, Rysst Gustafsson and Eriksson (2020) conducted a systematic review and revealed that patient safety is an important indicator for the outcome of quality care. Thus, nurses have the responsibility to avoid any kinds of damages to their patients.

6 | LIMITATIONS

In terms of limitations, this study was conducted in the setting of Chinese general tertiary hospitals; it did not consider nurses in secondary or primary hospitals. Therefore, it is recommended to examine the QNCS in other kinds of hospitals to enhance the generalizability of the study results.

7 | IMPLICATIONS TO PRACTICE

The developed QNCS can help clinical nurses be more aware of what comprises good QNC and provide them with directions for improvement. Nurses can use the QNCS to assess the quality of the service they provide and that of their peers, identify weaknesses and make improvements. Nurse managers can also use the QNCS to assess nurses' QNC and find problems related to individual nurses or the entire healthcare system. From such information, the nurse managers can design effective educational programs to enhance nurses' abilities and awareness in relation to the provision of QNC. Finally, by using the QNCS outcomes, managers can identify the organizational-level problems and implement quality improvement programs. Through these effective strategies, cost savings and optimal care can be achieved.

8 | CONCLUSION

To our knowledge, this study developed the first QNCS to assess QNC from the nurses' perspective in the context of contemporary Chinese hospitals. The QNCS has been shown to have different kinds of acceptable validity (content validity and construct validity) and reliability (ICR). The developed scale can be used by nurses to assess themselves or their peers as they provide nursing care services and raise their awareness about possible areas for improvement. Additionally, nurse managers can also use the QNCS to identify problems related to service quality, thus improving QNC at the organizational level.

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CONFLICT OF INTEREST

There is no conflict of interest.

AUTHOR CONTRIBUTIONS

Ying Liu (YL), Yupin Aungsuroch (YA), Joko Gunawan (JG), Liyan Sha (LYS), Tieying Shi (TYS) made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data. YL, YA, JG, LYS and TYS involved in drafting the manuscript or revising it critically for important intellectual content. YL, YA, JG, LYS and -TYS gave final approval of the version to be published. Each author has participated sufficiently in the work to take public responsibility for appropriate portions of the content.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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