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Development and validation of the Chinese surgical inpatient satisfaction and comfort questionnaire

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Abstract

Patient feedback can provide insights to assess and improve the quality of healthcare. This study aimed to develop a measure of surgical inpatient satisfaction and comfort and examine its acceptability, validity, and reliability among discharged surgical patients.

This multicenter, descriptive, cross-sectional study was conducted at three tertiary hospitals in Shaanxi Province, China. A random sample of patients admitted to the surgical inpatient departments of the three hospitals between November and December 2018 was recruited. An analysis was conducted on the acceptability, validity, and reliability of a newly developed measure of satisfaction with surgical inpatient services.

A total of 1582 out of 1805 (87.6%) eligible patients completed the questionnaire (average time taken = 17.1 ± 10.3 minutes), which indicated high acceptability. Sociodemographic differences between the participants and non-participants were not significant. Using factor analysis, the following 7 dimensions (number of items: 65, variance explained: 68.0%) were identified: medical care (19 items), nursing care (15 items), environment and logistics (11 items), postoperative and hospitalization experiences (11 items), feeling nervous and afraid (4 items), operating room services (3 items), and visiting (2 items). The latent structure of the assessment was examined and validated using exploratory and confirmatory factor analyses, respectively. All item loadings were >0.4. All dimensions demonstrated satisfactory internal consistency (Cronbach's alphas = 0.83–0.96) and test-retest reliability (intra-class correlation coefficients = 0.77–0.96).

The Chinese Surgical Inpatient Satisfaction and Comfort Questionnaire has strong psychometric properties and can be used to assess patient satisfaction with public hospital surgical inpatient services in China. A distinguishing feature of this questionnaire is the inclusion of a subscale that assesses comfort as a dimension of patient satisfaction. Such instruments can be used to identify the factors that should be addressed to improve the quality of patient care. Further research is needed to determine the role of assessment in quality improvement.

Abbreviations: CFA = confirmatory factory analysis, CFI = comparative fit index, LOS = length of stay.

Keywords: patient comfort, patient experience, patient satisfaction, quality of health care, reliability, validity

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1. Introduction

Previously, service delivery and quality of healthcare were assessed largely using objective outcome measures based on the reports of providers, but they are now evaluated with patient-reported outcomes (e.g., patient satisfaction, experience, comfort, and perceived quality of healthcare). Clinicians, researchers, and policymakers are increasingly considering these outcomes to be as important as clinical effectiveness and patient safety.[1–4] Patient-reported assessments provide healthcare professionals with the information needed to improve healthcare delivery and evaluate the effectiveness of new healthcare management strategies (e.g., enhanced recovery after surgery programs).[5,6]

Patient satisfaction, patient experience, and patient comfort are terms often used interchangeably, although they differ by definition and conceptual construction. Patient satisfaction is defined as patients' reactions to the salient aspects of the contexts, processes, and outcomes of their experiences. Inpatient satisfaction consists of the following components: process (satisfaction with the quality of care and hospital ambiance), outcome (improvement in perceived health status), and context (the psychological aspects of hospitalization).[7] Healthcare quality can be assessed and improved by gaining insight from patient feedback about the care they receive.[8] Structured questionnaires that assess patient satisfaction are by far the most effective and commonly used tools.[9,10]

Conversely, patient experience is defined as events that happen to patients and the extent to which patients' needs are met. In addition to asking patients to rate their level of satisfaction using predefined response options, patient experience can be assessed by asking them to provide details about different aspects of the events that occurred during a specific episode of care reception.[8] Measures of patient experience assess the specific processes and events that occur during care reception and determine how such experiences influence patient satisfaction.[11]

Furthermore, patient comfort is a personalized and integral experience that enhances patient satisfaction and well-being.[12] Holistic comfort is an immediate desired outcome that is achieved when 3 types of comfort are experienced (i.e., relief, ease, and transcendence) in 4 contexts (i.e., physical, psychospiritual, sociocultural, and environmental).[13,14] The intersection of these 3 types of comfort and 4 contexts of experience yields a twelve-cell grid, which can be used to assess patient comfort.

At present, the majority of the questionnaires pertaining to inpatient surgical and medical care measure patient satisfaction within specific domains such as communication, physical comfort, pain control, and hospital environment.[15] Only a few assessments consider patient comfort to be a direct indicator of healthcare quality.[12] However, research suggests that optimal patient comfort is correlated with shortened hospital length of stay (LOS), improved patient satisfaction, and increased cost-benefit ratios.[14] Therefore, the evaluation of inpatient satisfaction should include the assessment of patient comfort using valid and reliable tools.

Recently, an increased number of measures of inpatient satisfaction and experience have been developed for use in surgical and medical wards. However, some of these assessments have not been rigorously developed and validated (i.e., their psychometric properties and utility have not been adequately tested).[9,10,12,15] In addition, the conceptualized framework of measurement tools for patient satisfaction is greatly influenced by cultural backgrounds and healthcare systems, and satisfaction outcomes are highly related to cultural uniqueness.[16–18] Due to language barriers, cultural differences, and variations in healthcare systems, even well-validated questionnaires may be unsuitable for use with Chinese patients who receive surgical services in hospitals in China (i.e., our target population).

Furthermore, none of the existing Chinese versions of the measures of inpatient satisfaction quantitatively assess the comfort levels of adult patients.[12,19,20] Surgical interventions are associated with a wide range of distressing emotions such as fear, discomfort, anxiety, and pain. As such, hospitalization may affect the holistic functioning of surgical patients. Therefore, it is important to assess patient comfort in surgical wards to identify their comfort needs, plan interventions that address their needs, and evaluate the efficacy of such interventions in research and practice.

This study aimed to develop an acceptable, reliable, and valid measure of inpatient satisfaction with the surgical services provided by public hospitals in China. We hypothesized that it is possible to develop such an instrument specific to the Chinese cultural and healthcare context, and derive underlying dimensions that assess patient satisfaction as well as perceived patient comfort in relation to their surgical experiences.

2. Methods

2.1. Study design

This multicenter cross-sectional survey was conducted in three tertiary hospitals in Shaanxi Province, China, which are large-scale referral centers with over 500 inpatient beds that provide complex healthcare. Trained interviewers (staff members of the three hospital units) administered the questionnaires (in Chinese).

2.2. Participants

Patients who had been admitted to the surgical inpatient departments (all types of surgeries) of Tangdu Hospital (Xi'an, China), Hanzhong 3201 Hospital (Hanzhong, China), and Baoji Central Hospital (Baoji, China) between November and December 2018 were included in the study. The inclusion criteria were as follows: age ≥18 years, had been an inpatient for at least 24 hours, and provided informed consent. We excluded patients who had psychological or mental disorders, disturbance of consciousness, and significant cognitive impairment (defined by a Mini-Mental State Examination score of <24) and were unable to cooperate with the clinician.[9] Considering the general recommendations on the sample size for internal validation of measurement scales, we aimed to sample approximately 10 to 15 times more than the item number (500–1000 participants) as the scale contains 65 items.[21,22] The sample size needed for the construct validity and reliability analyzes was calculated using Cochran's formula. Based on the most conservative estimate of $P = 50\%$ (which gives the maximum variance), the minimum sample size was 1067 with a 95% confidence level and a 3% margin of error. Based on a review of the literature, we expected the response rate to be approximately 60% (typical response rate ranged from 50%–90%).[8,17,23–28] Accordingly, we planned to administer the questionnaire to approximately 1800 patients.

2.3. Questionnaire development

We developed the patient satisfaction questionnaire in accordance with the procedure described by Gonzalez et al[23] First, a

comprehensive literature search was conducted to identify measures of patient satisfaction that have previously been validated in national and international studies. The PubMed and Embase databases (available through institutional subscription) were searched using the following key-words searching strategy: ("patient satisfaction" OR "patient experience" OR "patient comfort") AND "hospital" AND "questionnaire" (see Supplemental Digital Content S1, http://links.lww.com/MD2/A780 which illustrates the detailed search strategy). Studies published in languages other than Chinese and English were excluded. Indexes and questions were retrieved from published articles by 2 authors (BL and SL) independently. Items that assessed the processes, outcomes, and contexts related to hospitalization were considered for inclusion in the questionnaire, whereas items that were not consistent with the conventions of medical practice in China (e.g., religious care) were excluded. Disagreements were resolved by consensus with a third author (SH).

Group discussions were conducted with 10 healthcare professionals (5 hospital administrators, 3 officers from the nursing department, and 2 clinicians) and 10 patient representatives (who were selected using a simple random sampling method according to patients' admission numbers) to identify what they considered to be the most positive and negative aspects of in-hospital care. The data collected during these discussions were analyzed to develop the items. They were generated both deductively (i.e., based on the literature) and inductively (i.e., based on empirical data). This process yielded a pool of questions, that assessed the most important aspects of in-hospital care and the factors that influence patient satisfaction and comfort. Next, the 10 healthcare professionals and a new group of 20 patients (who were also randomly selected) were asked to provide feedback about each item. Specifically, they were asked to comment on the importance of the items, the relevance of the issues covered by the items, and the comprehensibility of the questions and response options. Based on their feedback, the research group modified the items and developed an initial draft of the questionnaire, which consisted of 65 items.

A pilot study was conducted with 30 randomly selected patients to evaluate the appropriateness, comprehensibility, and clarity of the items. Cognitive debriefing was conducted in accordance with the standard procedure and using standard questions.[29] The research group identified (a) discrepancies between patient interpretations of the meanings of the items or response options and their intended meanings, and (b) items that were found to be unclear. Based on the results of the pilot study, amendments were made to the problematic items, but, few were reworded. None of the items had a high nonresponse rate or demonstrated poor variability. Therefore, none of the items were excluded. The psychometric properties of the resultant 65-item instrument were subsequently field-tested.

Based on theoretical considerations, the final draft of the Chinese Surgical Inpatient Satisfaction and Comfort Questionnaire was designed to consist of 2 sections. Sections A and B consisted of 50 and 15 questions, respectively (see Supplemental Digital Content S2, http://links.lww.com/MD2/A781 which illustrates the questions included in the Chinese Surgical Inpatient Satisfaction and Comfort Questionnaire). Section A primarily assessed patient satisfaction with inpatient services, while Section B primarily focused on subjective feelings and perceived comfort in relation to patient experiences of their surgeries and hospital stay. The 50 questions subsumed under Section A were categorized into 5 domains: environment and logistics, inpatient nursing care, operating room (OR) services, medical care, and global assessments. Each item was rated on a 5-point Likert scale ranging from 1 to 5. Higher scores were indicative of higher levels of patient satisfaction (1 = completely dissatisfied, 2 = moderately dissatisfied, 3 = neutral, 4 = moderately satisfied, 5 = completely satisfied). Each of the 15 items subsumed under Section B was rated on a severity scale that ranged from 1 to 5 (1 = extremely severe, 2 = severe, 3 = moderate but tolerable, 4 = mild, 5 = none). Higher scores were indicative of higher levels of comfort. The following sociodemographic characteristics were assessed: age, sex, marital status, number of children, educational level, professional status, and monthly household income. Additionally, a measure of self-perceived personality traits (i.e., extravert, neutral, introvert, or pessimist), and an overall happiness index were also included in the questionnaire. Overall happiness was assessed using a previously validated single-item assessment.[30] The participants were asked to indicate their subjectively perceived overall level of happiness on a 4-point scale, which included the following response options: low (unhappy), mid (not bad), mid-high (relatively happy), and high (very happy). Their clinical characteristics (including the primary diagnosis that warranted admission and hospital LOS) were documented by the research assistants.

2.4. Survey

A random sample of eligible and consenting patients who had been discharged from the surgical inpatient departments of the aforementioned hospitals was recruited. On the day of their discharge, face-to-face interviews were conducted with the patients to administer the questionnaire. Of the 1805 eligible patients who were approached and requested to participate in the survey, 1582 consented. The remaining 223 patients were excluded (refusal to participate: n=178, refusal to provide consent for publication of their data: n=45) (see Supplemental Digital Content S3, http://links.lww.com/MD2/A782 which demonstrates flow diagram of patient recruitment). Thus, the response rate was 87.6%. The data were collected anonymously and treated confidentially.

2.5. Compliance with ethical standards

Local institutional review board approval to perform this study and to use archived material for research purposes was obtained from Tangdu Hospital Ethics Committee (Xi'an, China) on July 29, 2018 (approval No. 201807-09). The study adhered to the principles outlined in the United States Code of Federal Regulations, Title 45, Part 46, Protection of Human Subjects, revised June 23, 2005, and the World Medical Association Declaration of Helsinki. Written informed consent was obtained from each participant.

2.6. Statistical analysis

Descriptive statistics, frequencies and percentages were computed for categorical variables, and means and standard deviations were computed for continuous variables. The psychometric properties of the 65 items were examined by determining their acceptability, validity, and reliability.

The acceptability (i.e., ease of use) of the assessment was examined by determining the percentage of missing values for

individual items and the time taken to complete the questionnaire.[17,25,27]

The construct validity of the assessment was examined by conducting a factor analysis using a 2-step procedure. Participant responses (n = 1582) were divided into 2 datasets: a training dataset (n = 1000) and a validation dataset (n = 582). Using principal component analysis (exploratory factor analysis, EFA), the training dataset was analyzed to determine the latent structure of the assessment. First, the Kaiser–Meyer–Olkin (KMO) statistic was computed and Bartlett test of sphericity was conducted to examine the strength of the inter-correlations among the items and determine whether the population correlation matrix was an identity matrix. An item was included in the analysis only if the correlation matrix among the captioned items was factorable (i.e., KMO statistics ≥ 0.6 and a significant P value $< .05$ yielded by Bartlett test). Principal component analysis with varimax rotation was conducted to determine the number of latent factors. Factors with eigenvalues ≥ 1 were retained.[17] Items with loadings or explained variances > 0.4 were retained within their respective factors.[17,23] Items that loaded onto several factors were assigned to the factors with which they shared a stronger conceptual relationship. Next, the resultant factor structure was tested by conducting a confirmatory factor analysis (CFA) using the validation dataset. The overall fit between the model and the data was examined by computing the Chi-Squared statistic (smaller values indicate a better fit), Chi-Squared ratio (values ≤ 3 indicate a good fit), non-normed fit index (values > 0.9 indicate a good fit), comparative fit index (values > 0.9 indicate a good fit), incremental fit index (values > 0.9 indicate a good fit), goodness-of-fit index (values > 0.9 indicate a good fit), standardized root mean square residual (values < 0.08 indicate a good fit) and root mean square error of approximation (values < 0.08 indicate a good fit).[7,31]

The convergent validity (item-total correlations) of the assessment was examined by inspecting the correlation between each item and its corresponding dimension. Pearson's correlation coefficients (r) > 0.4 (corrected for overlap) were considered to be acceptable. The discriminant validity was examined by comparing the correlation between each item and (a) the dimension that it assessed and (b) other dimensions.[17,32]

The content validity of the finalized assessment was examined.[27,33] Dimension scores were calculated by summing the individual scores of the valid items within a dimension and dividing the resultant value by the total number of valid items. These values were linearly transformed into standardized scores, ranging from 0 to 100 (100 = highest level of satisfaction and comfort). When a participant failed to respond to more than half of the constituent items, the subscale score was entered as a missing value.[17,23,25]

The clinical validity of the scale was determined using the known-groups method, whereby age, sex, and LOS differences were examined. Most past studies on inpatient satisfaction have found that men and women obtain similar satisfaction scores, and older patients obtain higher satisfaction scores than younger patients.[17,19,23,24] However, neither age nor sex was a reliable predictor of satisfaction in surgical settings.[34] Therefore, we analyzed the relationships of age, sex, and LOS with patient satisfaction in the current cohort.

The internal consistency (reliability) of each dimension was assessed by computing Cronbach's alpha coefficients (α). The coefficients can range from 0 (no internal consistency) to 1 (items are virtually identical). Internal consistency coefficients ≥ 0.7 were considered satisfactory.[25,27] Inter-dimensional correlations were examined by computing Pearson's correlation coefficients (r). These values should be lower than the Cronbach's alpha (α) of each dimension to support the independence of each dimension.[28]

The test-retest reliability (i.e., external reliability) of the assessment was examined by administering the questionnaire to a subgroup of the participants. A random subsample of 150 patients (approximately 10% of the participants) completed the questionnaire after 1 month during their follow-up visits. Intraclass correlation coefficients were calculated to examine the test-retest reliability of each dimension.[27]

Data were tested for normality of distribution and homogeneity of variance before each analysis. Based on appropriateness, either the chi-squared test or Fisher exact test was used to examine group differences in categorical variables and either an analysis of variance or the Mann–Whitney U test was used to examine group differences in continuous variables. The level of statistical significance was set at $P < .05$. All the tests were 2-sided, and all analyses were conducted using SPSS software (version 16.0, SPSS, Inc.) and R software (version 3.6.1, R Development Core Team) package lavaan (version 0.6-5).

3. Results

A total of 1582 patients participated in the survey. Table 1 shows that the participants and nonparticipants did not differ significantly in their sociodemographic characteristics.

3.1. Acceptability

The average time taken to conduct the interview and administer the questionnaire was 17.1 ± 10.3 minutes. Not all participants answered each questionnaire item. The percentage of missing values for individual items ranged from 0.1% to 4.0%. A majority of the participants understood the questions without any difficulty and completed the questionnaire independently. Only 180 (11.4%) patients required help from family members or research assistants. The main reasons underlying their need for assistance were poor vision, illiteracy, and an inability or unwillingness to write. Overall, the questionnaire demonstrated satisfactory acceptability.

3.2. Validity

With regard to construct validity, the latent structure of the assessment was explored by conducting EFA using the training dataset. The KMO statistic and results of Bartlett test of sphericity indicated that all 65 items were adequately inter-correlated ($r = 0.973$, $P < .0001$). All the items had loadings > 0.4 and were, therefore, subjected to factor analyses. Nine factors were extracted, explaining 68.0% of the variance. The 9 factors were regrouped into 7 dimensions, which were named based on the contents of their items. We ensured that no dimension consisted of only one item. The dimensions demonstrated strong internal consistency (αs = 0.83–0.96). The 7 dimensions were as follows: medical care (19 items), nursing care (15 items), environment and logistics (11 items), postoperative and hospitalization experiences (11 items), feeling nervous and afraid (4 items), OR services (3 items), and visiting (2 items) (Table 2).

Using the validation dataset, CFA was conducted to validate the factor structure that was derived based on the results of the

Table 1

Sociodemographic characteristics.

Variable	Participants (n = 1582)	Non-participants (n = 223)	*P* value
	Mean ± SD		
Age (yr)	50.9 ± 15.9	52.0 ± 20.7	.35
Hospital LOS (d)	11.1 ± 14.0	11.9 ± 15.7	.43
	No. of patients (%)		
Sex			.29
Male	826 (52.2)	108 (48.4)	
Female	756 (47.8)	115 (51.6)	
Marital status			.10
Single	123 (7.8)	15 (6.7)	
Married	1410 (89.1)	195 (87.4)	
Divorced/widowed	49 (3.1)	13 (5.8)	
Occupation			.07
Employed	449 (28.4)	69 (30.9)	
Unemployed	320 (20.2)	54 (24.2)	
Retired	377 (23.8)	59 (26.5)	
Homemaker	402 (25.4)	38 (17.0)	
Student	34 (2.2)	3 (1.3)	
Education			
No education/primary school	688 (49.5)	N/A	
Secondary school/high school	377 (27.1)		
College/more than college	324 (23.3)		
Monthly household income (RMB¥/USD$)			
> ¥10,000/$1554	100 (7.0)	N/A	
¥5000–¥10,000/$777~1554	229 (16.0)		
¥3,000–¥5000/$466~777	666 (46.5)		
< ¥3000/$466	436 (30.5)		
Personality			
Extravert	631 (43.7)	N/A	
Neutral	614 (42.6)		
Introvert	177 (12.3)		
Pessimist	21 (1.5)		
Level of happiness		N/A	
High	473 (34.0)		
Mid–High	332 (23.9)		
Mid	554 (39.9)		
Low	31 (2.2)		

LOS = length of stay, RMB = Chinese Yuan Renminbi, USD = United States dollar.
The sample size in each item differs because not all participants answered all questionnaire items.

EFA. When compared to the null model (with 0 covariance between the items), the 7-dimension model was a good fit for the data (Chi-Squared statistic = 2156, degrees of freedom =1090, Chi-Squared ratio =2.0, non-normed fit index = 0.93, comparative fit index = 0.96, incremental fit index = 0.96, goodness-of-fit index = 0.94, standardized root mean square residual = 0.04, root mean square error of approximation = 0.08 [90% CI 0.07–0.09]). These findings support the robustness of the latent structure of the assessment.

All item-total correlation coefficients were >0.4. This finding was indicative of satisfactory convergent validity (Table 3). Conversely, the correlation between each item and its corresponding dimension was always stronger than its correlation with any other dimension. This finding supported the discriminant validity of the scale (Table 3).

The content validity of the scale was assessed by examining the feedback of the participants. They found all the items to be comprehensible and clear, and none of the items were found to be confusing. They were unable to name any other factor influencing patient satisfaction and comfort that should have been assessed and was not measured by the assessment.

The psychometric properties of each dimension and corresponding descriptive statistics are presented in Table 3. The highest level of satisfaction and ceiling effect percentage (80.5%) emerged for visiting. In contrast, the lowest level of satisfaction and comfort, highest floor effect percentage (0.5%), and lowest ceiling effect percentage (18.8%) emerged for feeling nervous and afraid. The floor and ceiling effect percentages that emerged for the other dimensions also corresponded to the emergent levels of satisfaction and comfort (i.e., mean and median scores).

With regard to clinical validity, there were no statistically significant differences among the groups, divided according to age, sex, or LOS (Table 4).

3.3. Reliability

All dimensions demonstrated satisfactory internal consistency. The Cronbach's α ranged from 0.83 to 0.96 (Tables 3 and 5). The inter-dimensional correlation coefficients were lower than the internal consistency coefficients that emerged for each dimension. However, relatively strong correlations emerged between medical care and nursing care ($r = 0.82$), medical care and OR services

Table 2

Dimensions derived from the results of factor analysis and item loadings.

	Dimensions*						
Item (Question number in the questionnaire)	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Pain and discomfort management (A39)	0.80						
Doctors' attention (A35)	0.80						
Doctors' explanations about treatment (A33)	0.80						
Doctors' technical ability (A37)	0.80						
Doctors' rounds (A38)	0.79						
Global assessment of medical care (A44)	0.78						
Doctors' interest in patients' questions (A34)	0.78						
Attitude of doctors (A31)	0.77						
Discharge counseling (A22)	0.76						
Privacy in ward (A36)	0.75						
Arrangement of examinations and surgery (A41)	0.75						
Prompt response to call (A21)	0.73						
Treatment effect (A40)	0.72						
Overall experiences (A49)	0.70						
Overall service flow (A46)	0.69						
Physical comfort (A47)	0.66						
Mental comfort (A48)	0.58						
Service of hospital attendant (A45)	0.57						
Doctors' explanations of the disease (A32)	0.56						
Global assessment of ward nursing care (A42)		0.75					
Global assessment of OR nursing care (A43)		0.73					
Nurses' technical ability (A20)		0.72					
Nurses' interest in patients' questions (A16)		0.71					
Nurses' attention (A18)		0.70					
Nurses' empathy (A17)		0.70					
Nurses' assistance (A19)		0.70					
Nurses' appearance (A14)		0.69					
Attitude of nurses (A15)		0.69					
OR nurses' comfort (A25)		0.66					
OR nurses' preoperative visit (A23)		0.65					
Care & attention of OR nurses (A27)		0.65					
Admission counseling (A13)		0.65					
Privacy in OR (A26)		0.64					
Attitude of OR nurses (A24)		0.57					
Environmental noise (A7)			0.74				
Quality of sleep (A9)			0.71				
Ward and room facilities (A2)			0.69				
Quality of food (A10)			0.67				
Room cleanliness (A3)			0.65				
Roommate (A8)			0.65				
Room comfort for the family (A6)			0.64				
Temperature and humidity (A4)			0.61				
Bedding cleanliness and comfort (A5)			0.56				
Expense (A50)			0.52				
Smooth admission process (A1)			0.49				
Indescribable uncomfortable feeling (B9)				0.80			
Listlessness (B8)				0.78			
Other discomfort (B3)				0.76			
Mood (B10)				0.70			
Sleep problem (B6)				0.69			
Suffering experiences (B11)				0.68			
Urination and defecation problem (B5)				0.66			
Postoperative starvation (B4)				0.64			
Fever (B7)				0.64			
Postoperative nausea and vomiting (B2)				0.58			
Postoperative pain (B1)				0.43			
Pre-operation nervous & fear (B13)					0.89		
Nervous & fear in the OR (B14)					0.87		
Preadmission nervous & fear (B12)					0.83		
Current fear of surgery (B15)					0.63		
Temperature and humidity of OR (A29)						0.53	
Attitude of anesthesiologist (A28)						0.50	
Environmental comfort of OR (A30)						0.49	
Family accompany (A11)							0.46
Visiting (A12)							0.41

OR = operation room.

* Dimension 1: Medical care, 2: Nursing care, 3: Environment and logistics, 4: Postoperative and hospitalization experiences, 5: Feeling nervous and afraid, 6: OR services, 7: Visiting

Table 3

Psychometric properties of each scaled.

Dimension	n	Median	Mean ± SD	Floor effect (%)	Ceiling effect (%)	Items included in each dimension	Item-total correlations (range)	Item discriminant validity (range)	Cronbach's alpha coefficients (α)	Intra-class correlation coefficients *
1: Medical care	1582	100.0	96.3±7.4	0.1	61.8	19	0.47–0.86	0.03–0.41	0.96	0.92
2: Nursing care	1582	100.0	96.2±7.9	0.1	60.8	15	0.48–0.84	0.09–0.47	0.94	0.93
3: Environment and logistics	1580	97.0	92.9±9.6	0.1	41.3	11	0.59–0.80	0.13–0.65	0.91	0.83
4: Postoperative and hospitalization experiences	1547	90.9	88.4±11.7	0.0	21.7	11	0.43–0.82	0.11–0.30	0.86	0.77
5: Feeling nervous and afraid	1525	75.0	74.7±18.0	0.5	18.8	4	0.75–0.91	0.10–0.45	0.87	0.79
6: OR services	1574	100.0	96.5±8.8	0.1	76.9	3	0.55–0.72	0.16–0.49	0.89	0.83
7: Visiting	1578	100.0	96.4±8.4	0.1	80.5	2	0.91–0.92	0.11–0.58	0.83	0.96

* *P* values all <.001

($r=0.71$), medical care and environment and logistics ($r=0.70$), and nursing care and environment and logistics ($r=0.72$) (Table 5).

All dimensions yielded significant correlation coefficients and demonstrated satisfactory test-retest reliability. The intra-class correlation coefficients ranged from 0.77 to 0.96 (Table 3).

4. Discussion

This study is the first to develop and validate a measure of surgical inpatient satisfaction during hospitalization, which includes a subscale to assess patient comfort among patients in Mainland China. The results underscore the psychometric properties of the Chinese Surgical Inpatient Satisfaction and Comfort Questionnaire.

The instrument was developed based on the results of a comprehensive literature review and focus group discussions, which were conducted with both healthcare providers and patients to facilitate concept elicitation and generate qualitative data. As recommended by other researchers, the initial item pool was pilot tested, and the content validity of the assessment (i.e., appropriateness, comprehensibility, and clarity of the items) was examined.[23,35] The central role of the patient perspective in the item development process was emphasized, and the initial framework was revised accordingly. This process yielded the questionnaire that was subjected to tests of its psychometric properties.

The EFA showed that the assessment was undergirded by a 9-factor structure. The 9 factors were regrouped into 7 dimensions based on the content of the items. They demonstrated strong internal consistency ($\alpha=0.83$–0.96). The multidimensional structure and individual dimensions of this instrument are similar to those of previously validated measures of patient satisfaction. Specifically, they are undergirded by a framework that consists of domains such as the overall process of care, understanding and improving perceived health status, and psychological well-being.[7,19,23,27] These findings and the satisfactory fit indices that were yielded by CFA support the robustness of the structure established in this study.

A distinguishing feature of the questionnaire developed in this study is the inclusion of a subscale that assesses comfort as a dimension of patient satisfaction. Patient comfort, which is a personalized and integral experience, enhances patient satisfaction and well-being.[12] Surgical interventions are associated with a wide range of distressing emotions such as fear, discomfort, anxiety, and hospitalization, which may affect the holistic functioning of surgical patients. Therefore, measures of patient comfort may paint a nuanced and accurate portrait of patient experiences. Measures of patient satisfaction that are grounded in a better understanding of patient experiences will yield more meaningful indicators of the quality of care.

One major concern surrounding the measurement of patient satisfaction is that the instrument may fail to assess the participants' true feelings.[36] Indeed, past studies have found that such tests overestimate the overall satisfaction levels of their participants, yield skewed data, and are inadequate measures of dissatisfaction.[11,26,37] In this study, high levels of satisfaction emerged for most dimensions, including medical care, nursing care, environment and logistics, OR services, and visiting. However, lower scores emerged for the two dimensions that focus on patient comfort during hospitalization (i.e., postoperative and hospitalization experiences and feeling nervous and afraid). This variability in the levels of satisfaction that emerged for the different dimensions underscores the questionnaire's ability to detect individual differences among the participants.

In contradistinction to the questionnaires that have been developed in Western countries,[17,23] "expense" emerged as a single-item factor when EFA was conducted. This item was included in the environment and logistics dimension to ensure that the instrument did not contain any single-item dimensions. Nevertheless, this finding highlights the predominance of the fee-for-service payment mode in China. Moreover, several items belonging to the dimensions of medical and nursing care were related to information transfer and communication between caregivers and patients. This finding underscore prevalent cultural norms in China, whereby healthcare professionals often feel more comfortable communicating openly with family members than with patients. Similarly, the absence of a subscale that assesses religious care[28] is also consistent with such cultural differences. These discrepancies in their contents and structures further underscore the need for a questionnaire specifically designed for use within the Chinese cultural context.

Contrary to past findings,[17,19,23,24,36,37] there were no age or sex differences in satisfaction and comfort in this study. Additionally, LOS did not seem to affect the scores of the 7 domains in the current questionnaire. Although patient characteristics such as age, health status, income, and preferences for involvement and information have been found to have an impact on patient satisfaction, their contributions to overall evaluations of the quality of care remain equivocal.[9,37] The only strong independent predictor was the number of patient-reported problems related to care.[37]

Given that the participants and nonparticipants did not differ significantly in their sociodemographic characteristics, the emergent acceptability (i.e., high response rate and acceptable

Table 4

Known-groups comparisons on the dimensions of satisfaction and comfort.

	Dimension*						
Known-groups	Medical care	Nursing care	Environment and logistics	Postoperative and hospitalization experiences	Feeling nervous and afraid	OR services	Visiting
Age (yr)							
≤40 (n=368)	96.2±7.3	95.8±8.1	92.4±9.9	88.7±11.1	73.0±18.4	96.3±7.5	96.8±8.2
41–50 (n=350)	96.7±7.6	96.5±7.7	93.4±9.6	89.4±11.2	75.5±17.9	96.8±8.1	96.5±8.6
51–65 (n=507)	96.1±7.5	96.1±7.3	93.2±9.2	87.6±12.2	74.7±18.2	96.7±10.4	96.0±8.7
>65 (n=357)	96.2±7.2	96.6±8.8	92.6±9.8	88.3±11.9	75.5±17.2	96.1±7.9	96.4±8.1
P value	.74	.52	.46	.19	.19	.70	.58
Sex							
Male (n=826)	96.3±6.9	96.3±8.2	92.7±9.5	88.5±11.8	75.2±18.6	96.4±7.4	96.4±8.4
Female (n=756)	96.1±7.9	96.0±7.8	92.9±9.8	88.0±11.8	74.0±17.4	96.5±10.2	96.2±8.7
P value	.59	.48	.70	.39	.20	.87	.67
Hospital LOS (d)							
≤5 (n=462)	96.4±7.1	96.0±7.7	93.4±9.8	88.7±11.7	74.3±17.4	96.3±8.1	96.7±8.4
5–10 (n=615)	96.3±7.1	96.4±8.3	93.1±9.2	88.5±11.5	74.4±18.2	96.8±9.8	96.5±8.0
>10 (n=505)	96.1±7.9	96.3±7.6	92.4±9.8	87.9±11.9	75.3±18.2	96.4±8.0	95.9±8.9
P value	.75	.67	.26	.48	.64	.54	.32

LOS = length of stay.
* Scores presented as mean ± SD.

time duration to complete the questionnaire) of the assessment supports its use with a wide range of patients.

Notably, this questionnaire was developed so that future studies can identify the factors that are associated with satisfaction, evaluate and redesign the surgical care process, and determine the effectiveness of possible interventions on patients who have received surgical inpatient services. Therefore, several items were designed to be specific to the surgical conditions and perioperative experiences. In addition, the sample used in this cross-sectional study represented the population of adult surgical inpatients (admitted to all types of surgical departments). Therefore, this questionnaire should be used with only members of this population and not nonsurgical patients, outpatients, or pediatric patients.

Furthermore, this study has several limitations. First, the exclusion of ineligible participants and the presence of missing values in the dataset may have resulted in sampling bias. Second, patient health status and health outcomes were not assessed in this study. Therefore, we could not determine their impact on patient satisfaction. However, existing evidence indicates that these are important factors that influence patient perceptions of care quality and satisfaction.[9,37] Third, high ceiling effect percentages emerged for several dimensions such as medical care, nursing care, OR services, and visiting. These findings underscore a possible bias toward overly positive evaluations. This may be attributable to the fact that our participants were required to complete the questionnaire on the day of their discharge from the hospital. Specifically, those who did so reported higher levels of satisfaction than those who completed the questionnaire at home at a later time.[38] However, according to some researchers, such assessments should be administered immediately after discharge to reduce recall bias and enhance test-retest reliability.[27] Concerning a possible Hawthorne effect, it will be better to have the patients answer the survey anonymously post discharge in future studies. In addition, indirect indicators of the patients' true feelings (e.g., the revisit rate and the willingness to recommend to relatives or friends) should be measured to validate the satisfaction score revealed by the survey. Fourth, with regard to the utility and intended purposes of the instrument, data about its cost efficiency and educational impact should be collected and analyzed in future studies.[12,15] In-depth reviews and refinements of this assessment should be undertaken to address these concerns.

The development, validation, and application of valid and reliable patient satisfaction questionnaires are of vital importance in both theory and practice. They are useful tools to enhance the theoretical understanding of quality management, guide medical institutions to improve service quality, and eventually, benefit the

Table 5

Internal consistencies and inter-dimensional correlations.

Dimension	Medical care	Nursing care	Environment and logistics	Postoperative and hospitalization experiences	Feeling nervous and afraid	OR services	Visiting
Medical care	**0.96**						
Nursing care	0.82	**0.94**					
Environment and logistics	0.70	0.72	**0.91**				
Postoperative and hospitalization experiences	0.30	0.26	0.31	**0.86**			
Feeling nervous and afraid	0.22	0.21	0.24	0.46	**0.87**		
OR services	0.71	0.60	0.53	0.20	0.13	**0.89**	
Visiting	0.57	0.63	0.63	0.19	0.14	0.45	**0.83**

Numbers in bold represent Cronbach's alpha coefficients.
P values all <.001 for inter-dimensional correlations.

patients. Compared with the well-developed healthcare system in Western countries, China's public healthcare system is currently undergoing reform. Additionally, medical services in China are costly and unfairly distributed. Therefore, it is imperative to strengthen the use of such patient satisfaction questionnaires, which not only serve as an indicator of healthcare quality, but also provide a reference for the deliberate layout of hospitals, proper utilization of capital budget and deployment of personnel.[19,20]

5. Conclusions

In this study, we developed and validated a multidimensional Chinese Surgical Inpatient Satisfaction and Comfort Questionnaire, which assesses patient satisfaction with public hospital inpatient services in China. The results support the acceptability, validity, and reliability of the instrument, which can be used in future studies that aim to evaluate and enhance patient satisfaction with hospital surgical services.

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