ORIGINAL ARTICLE

Development of Service Quality Scale for Surgical Hospitalization

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Background/Purpose: Findings from literature showed inconsistent results for applying service quality scale in hospitals. Moreover, hospitalization services are provided by diversified departments and a scale designed to measure the overall hospitalization quality is difficult and capturing special characteristics of different departments is also not an easy task. This study attempted to develop a service quality scale for surgical hospitalization (SQSH).

Methods: Forty-two items were designed via literature review, interviews with patients, health professionals and experienced care givers. A cross-sectional survey was conducted in one hospital. A total of 271 patients in surgical wards were chosen using stratified random sampling; 57.7% of the sampled patients were aged below 55, and 52.2% were male.

Results: The response rate was 93.4%. Twenty-nine items were retained through the scale development process and six factors were formed: needs management, assurance, sanitation, customization, convenience and quiet, and attention. Six factors explained 57.3% of total variance. Five experts assessed the content validity; content validity index was 0.964. Furthermore, all Cronbach's α exceeded 0.642 and all factor loadings exceeded 0.5. The concurrent validity correlation was 0.583, which had a p value below 0.01.

Conclusion: The SQSH has sufficient usefulness, reliability and validity. Future research on service quality can apply the SQSH scale to link with utilization intention and patient loyalty and attempt to develop a hospitalization quality scale for other departments. [*J Formos Med Assoc* 2007;106(6):475–484]

Key Words: scale development, service quality, surgical hospitalization

During the past decade, increased competition for funds and patients has gradually led hospitals in Taiwan to actively embrace and apply marketing concepts. In this harsh environment, service quality becomes strategically important in addressing patient needs. Meanwhile, revenues from hospitalization services represent a substantial proportion of hospital revenue and thus how to assess patient care service quality becomes an essential challenge for hospital administrators.

Previous studies have developed various measures of service quality based on various definitions of quality. One of the most frequently cited scales is the service quality scale SERVQUAL, which was proposed by Parasuraman et al[1] and subsequently refined.[2] SERVQUAL was developed based on the five-gap theory of Parasuraman et al,[3] and service quality was defined as the gap between consumer expectation and perception. SERVQUAL comprised 22 items and five dimensions: tangibles,

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reliability, responsiveness, assurance and empathy. Data used for the development of SERVQUAL were gathered in five service sectors: appliance repair and maintenance, retail banking, long-distance telephone service, securities brokerage and credit cards. Although these sectors covered various services, careful examination of SERVQUAL is also required to ensure its applicability to healthcare services.

Numerous studies have postulated that service quality is multidimensional in essence.[1,4–8] Vandamme and Leunis[9] confirmed the multiple-dimension property using the scale development approach and successfully demonstrated its usefulness for hospital administration. However, Lam[10] applied the 22 items of SERVQUAL[1] and showed that the five dimensions of SERVQUAL cannot be confirmed in the area of hospital services. The dimension of hospitalization service quality thus requires further investigation.

One study[11] developed the patient experiences questionnaire covering most subjects of interest to hospital patients. However, hospitalization services are provided by diversified departments and a scale designed to measure overall hospitalization quality has difficulty in capturing special characteristics of different departments. For example, pain management in surgical hospitalization can be more pervasive and influence perceived quality more than in internal medicine hospitalization. Therefore, developing a service quality scale for particular departments is essential in identifying accurate service dimensions. This study attempted to develop a service quality scale for surgical hospitalization. Surgical hospitalization was chosen as the focus of the present study for several reasons: (1) most general hospitals have surgical departments and (2) most hospitals provide hospitalization services.

This study used the scale development approach to investigate service dimensions used by patients to assess a key healthcare service, surgical hospitalization. The present study was new to the literature because no previous work developed a service quality scale for surgical hospitalization (SQSH). Additional quality related items were generated and verified, which captured the distinct nature of surgical hospitalization but were not included in SERVQUAL.

Methods

Sample

The data used in this study was gathered from one medical center in Taiwan. This medical center was chosen for several reasons: (1) it is one of the major medical centers in Taiwan and thus contains detailed surgical departments, and (2) patients of this medical center were not generally characterized by any specific characteristics (veterans, the standing army, highly religious, or living in metropolis). A proportionate stratified random sampling method was used. A total of 271 questionnaires were allocated among six types of surgical hospitalization wards: general surgery, orthopedics, urological surgery, rectal surgery, trauma surgery and cosmetic surgery based on the number of beds possessed by each type of ward. Each type of ward was assigned 19–73 questionnaires. Certain types of surgical wards, for example surgical intensive care unit, cardiac surgery, thoracic surgery, neurosurgery and breast surgery wards, were excluded owing to executive considerations. The data displayed several methodologic merits: (1) the sample size was sufficient compared to previous studies and (2) a proportionate stratified random sampling method was employed to ensure a representative sample.

The subjects were randomly selected. College students who majored in management issued self-administered questionnaires to patients and collected them following completion. Patients knew that they could refuse to participate in the study. All questionnaires were issued to patients who agreed to participate in the study. Each patient was compensated with nutritional supplements worth US$2. No hospital staff was involved in the data collection. The procedure was designed to minimize patient motivation to please their service providers. The number of effective returned questionnaires was 253, and the response rate was

93.4%. No regularities were found in ineffective questionnaires.

Questionnaire structure

The questionnaire contained two sections. The first section comprised two-column items in which subjects were asked to indicate "desired" and "actual" service performance. Each item was measured using a five-point Likert scale ranging from "strongly disagree" to "strongly agree". An additional item was included to measure overall service quality. The second section comprised questions on demographics.

Item pool

This study used the scale development approach rather than simply applying SERVQUAL because of the suitability of the scale development approach for the current research purpose. Items comprising the testing pool were obtained from four sources: (1) previous studies,[1,6,9,11–13] (2) scholarly opinions regarding service quality and/or healthcare management, (3) interviews with nurses who had related work experience and (4) complaints from patients with recent surgical hospitalization experience. Redundant items were removed and the wording of all items was slightly modified as appropriate. Forty-two items were gathered via the above process and are listed in Table 1.

The pool of measures contained items Q5, Q10, Q11, Q13, Q18, Q19, Q33, and Q34 that were relatively new to the literature and demonstrated the relevance of this study.

A pretest to confirm content validity is presented below. Five experts who had published academic works on related fields were invited to assess the degree to which items adequately measured service quality. Content validity index (CVI) was defined as the proportion of all items appraised as very adequate or adequate. The CVI turned out to be 0.964, indicating a high level of content validity.

Scale purification

Negatively worded items were reversely coded before following the purification process. Items were then tested and chosen using the scale purification process, which was suggested and utilized by Churchill[14] and Parasuraman et al.[1] This process contained three steps: (1) calculating Cronbach's α coefficient for each of the hypothesized dimensions and removing items with low item-to-total correlations, (2) performing factor analysis to check the dimension of the construct, and (3) reassigning items and adapting dimensions based on the results and proceeding to the first step. The process ended when the dimensionality stabilized. The scale purification process selected items that did not measure their common core to avoid excessive dimensions.

First, expectation scores had high value and low deviation. The average responses of 253 cases on all except three items ranged between 4.14 and 4.49, while all items had a five-point scale. This phenomenon is common in healthcare literature, suggesting that patients had difficulties in making tradeoffs between service quality components[9] and idealized expectations of healthcare quality.[10] Past research did not find significant difference between using actual scores and the difference scores to measure service quality.[6] Since there is no agreement regarding which of expectation, perception and the difference between them should be used for factor analysis, this study used perception scores for proceeding with the development owing to the low variability of expectation scores.

Results

Among effective questionnaires, 57.7% of subjects were aged below 55, 52.2% were male, 35.5% had education level below elementary school, 78.3% came from the northern area of Taiwan, 26.9% were admitted in the trauma department, and 64.8% had stayed longer than 6 days (up to the data collection date) (Table 2).

In the first step of the scale purification process, the 42 items were classified into five categories of SERVQUAL: tangibles, reliability, responsiveness, assurance and empathy. Each category comprised

Table 1. Item pool*

Tangibles
Q1 The hospital staff are clean and well-groomed
Q2 My room is kept clean
Q3 My room is sufficiently comfortable
Q4 Appliances in my room are maintained well
Q5 The sanitation facilities in my room are adequate
Q6 Medical equipment appears clean
Q7 I feel comfortable with the clothes provided
Q8 The hospital has clear signage
Q9 The hospital environment is quiet
Q10 Medical materials are uncomfortable
Q11 Other patients and their families disturb me in my room
Q12 The medical machinery in this hospital is outdated

Reliability
Q13 The hospital staff effectively alleviate my pain
Q14 Medical staff tell me when services will be provided
Q15 My operation is being performed according to the promised schedule
Q16 The hospital fulfills its promises
Q17 The hospital staff are skilful in performing their tasks
Q18 Restrictions on food and drink are clearly enforced

Responsiveness
Q19 The hospital staff provide me with psychologic support
Q20 The hospital staff are willing to help me
Q21 The hospital staff provide prompt service when needed
Q22 The hospital staff respond effectively to my complaints
Q23 When I have a problem, the hospital staff show a sincere interest in solving it

Responsiveness (continued)
Q24 The hospital staff are never too busy to respond to my medical requests
Q25 The hospital staff are never too busy to respond to my personal requests

Assurance
Q26 The hospital staff are sufficiently well informed to answer my questions
Q27 The hospital provides carefully-designed service processes
Q28 The hospital staff are trustworthy
Q29 Medical staff are consistently courteous
Q30 I receive sufficient information about my illness and its treatment
Q31 I have no doubts about the service processes

Empathy
Q32 The hospital staff respect my feelings
Q33 My pain gets enough care
Q34 The hospital staff eliminated my worries before my operation
Q35 The hospital staff meet my specific needs
Q36 The visiting hours suit me
Q37 The inspection hours suit me
Q38 I have enough privacy in my room
Q39 The hospital staff has my best interests at heart
Q40 I can participate in decisions regarding my medical treatment
Q41 The hospital staff understand my individual requirements
Q42 The administrative services are convenient

**The Chinese-version questionnaire is available at http://homepage.ntu.edu.tw/~ihcoa/teacher/kp/index.htm*

six to 12 items, as listed in Table 1. The cut-off value for item-to-total correlation was 0.35, as proposed by Nunnally.[15] According to this criterion, two items Q11 and Q12 were removed in the tangible category and one further item Q18 was removed owing to low item-to-total correlation in the reliability category. Factor analysis was performed as follows. Factors with eigenvalues exceeding one were retained. Bagozzi and Yi[16] proposed that factor loadings must exceed 0.5 to ensure convergent validity, and thus item loadings less than 0.5 on one factor were also removed from the measurement pool. The second step involved the removal of 10 items, while 29 items were retained and loaded on six factors, which were named: needs management, assurance, sanitation, customization, convenience and quiet, and attention.

This study then returned to check the internal consistency. Most items in each of the six factors had high to satisfactory reliability (all $\alpha > 0.7$)[15] except for the convenience and quiet dimension, which had an α of 0.642. The subsequent factor analysis did not support any change in dimensionality. Thus, the scale purification process ended since the dimensionality was stabilized. The factors, corresponding items and reliability statistics are presented below.

Six factors were retained and labeled (Table 3):

(1) *Needs management*: including pain management, visiting and inspecting time policy and personal needs.

Table 2. Demographic characteristics and utilization information of sample ($n = 253$)

	n (%)
Gender	
Male	132 (52.2)
Female	121 (47.8)
Age (yr)	
< 15	2 (0.8)
15–24	20 (7.9)
25–34	41 (16.2)
35–44	38 (15.0)
45–54	45 (17.8)
≥ 55	107 (42.3)
Education	
Illiterate	11 (4.3)
Elementary school	79 (31.2)
Junior high school	57 (22.5)
Senior high school	66 (26.1)
College/University	37 (14.6)
Graduate and above	3 (1.2)
Residence location	
Northern Taiwan	198 (78.3)
Central Taiwan	39 (15.4)
Southern Taiwan	13 (5.1)
Eastern Taiwan	1 (0.4)
Surrounding islands	2 (0.8)
Admission channel	
Self-referral	145 (57.3)
Referred by other hospital	37 (14.6)
Emergency department	71 (28.1)
Admission specialty (department)	
General surgery	63 (24.9)
Orthopedic	55 (21.7)
Urology	18 (7.1)
Colorectal surgery	28 (11.1)
Trauma	68 (26.9)
Plastic surgery	21 (8.3)
Current length of stay (d)	
1–2	27 (10.7)
3–5	62 (24.5)
≥ 6	164 (64.8)

(2) *Assurance*: ability of hospital staff to create patient trust and confidence in the hospital staff.

(3) *Sanitation*: cleanliness of the ward.

(4) *Customization*: degree to which the hospitalization process can be adjusted based on specific individual needs.

(5) *Convenience and quiet*: degree to which patients see staying in the hospital as convenient and quiet.

(6) *Attention*: extent to which hospital staff pay attention to patients rather than ignoring them.

The factors of service quality identified in this study did not match either the dimensions provided by Parasuraman et al[1] or those proposed by Lam.[10] The scale developed in this study was named SQSH, representing the service quality scale of surgical hospitalization.

The convergent validity was ensured since all factor loadings exceeded 0.5, which was suggested by Bagozzi and Yi.[16] The discriminant validity was supported if the squared correlation for each pair of factors was smaller than the average variance extracted for each factor.[17] This criterion generated 30 tests for this study. All tests of discriminant validity were passed except that the squared correlation between needs management and assurance was 0.596, which exceeded the average variance extracted of assurance.

The concurrent validity (one type of criterion-related validity) was also tested. The total score based on summing all factor scores was moderately and significantly correlated with the single-item overall quality ($r = 0.583$, $p < 0.01$, $n = 253$), suggesting that the SQSH scale had sufficient concurrent validity. The score for each factor was also significantly correlated with the single-item overall quality. These correlations ranged from 0.368 to 0.535 (0.461, 0.484, 0.535, 0.408, 0.444, 0.368, respectively), but the corresponding p values were all below 0.05, revealing sufficient concurrent validity for all factors. Recent studies that developed psychologic scales with criterion-related validity claimed their validity via having a positive and significant relationship ($p < 0.05$, r range, 0.3–0.6) between the target scores and the criterion value.[18,19] The correlations in this study ranged between 0.368 and 0.583, consistent with those recent studies.

Table 3. Factors and corresponding items*

Items	NM	Assu	Sani	Cus	Conv	Atten
Q13 The hospital staff effectively alleviate my pain	**0.687**	0.290	0.277	0.124	0.046	0.029
Q33 My pain gets enough care	**0.671**	0.203	0.264	0.291	0.067	0.127
Q35 The hospital staff meet my specific needs	**0.606**	0.356	0.179	0.212	0.202	0.126
Q32 The hospital staff respect my feelings	**0.593**	0.399	0.162	0.175	0.016	0.319
Q36 The visiting hours suit me	**0.583**	0.078	0.131	0.025	0.490	0.142
Q27 The hospital provides carefully-designed service processes	**0.538**	0.345	0.306	0.179	0.026	0.262
Q37 The inspection hours suit me	**0.503**	0.287	0.056	0.249	0.447	0.100
Q26 The hospital staff is sufficiently well informed to answer my questions	0.538	**0.533**	0.070	0.162	0.116	0.230
Q23 When I have a problem, the hospital staff show a sincere interest in solving it	0.320	**0.672**	0.109	–0.034	0.146	0.127
Q15 My operation is being performed according to the promised schedule	0.144	**0.666**	0.174	0.115	0.106	–0.025
Q14 Medical staff tell me when services will be provided	0.234	**0.622**	–0.058	0.088	0.068	0.069
Q30 I receive sufficient information about my illness and its treatment	0.027	**0.588**	0.164	0.523	0.044	0.020
Q16 The hospital fulfills its promises	0.089	**0.566**	0.350	0.167	0.047	0.369
Q17 The hospital staff are skilful in performing their tasks	0.276	**0.552**	0.228	0.033	0.090	0.213
Q31 I have no doubts about the service process	0.352	**0.535**	0.228	0.131	0.089	–0.213
Q28 The hospital staff are trustworthy	0.434	**0.512**	0.247	0.221	0.101	0.024
Q2 My room is kept clean	0.127	0.057	**0.789**	0.061	0.072	0.066
Q6 Medical equipment appears clean	0.270	0.171	**0.635**	0.027	0.131	0.295
Q5 The sanitation facilities in my room are adequate	0.126	0.168	**0.631**	0.249	0.166	0.182
Q4 Appliances in my room are maintained well	0.133	0.196	**0.631**	0.029	0.324	–0.087
Q3 My room is sufficiently comfortable	0.245	0.148	**0.570**	0.089	0.134	0.010
Q39 The hospital staff has my best interests at heart	0.106	–0.013	0.127	**0.747**	0.250	0.150
Q40 I can participate in decisions regarding my medical treatment	0.175	0.184	0.039	**0.717**	0.038	–0.030
Q41 The hospital staff understands my individual requirements	0.223	0.027	0.128	**0.659**	0.296	0.316
Q8 The hospital has clear signage	0.035	0.167	0.205	0.113	**0.707**	0.055
Q9 The hospital environment is quiet	0.235	0.057	0.254	0.170	**0.596**	0.147
Q42 The administrative services are convenient	–0.030	0.273	0.239	0.186	**0.524**	0.021
Q24 The hospital staff are never too busy to respond to my medical requests	0.301	0.204	0.158	0.204	0.172	**0.729**
Q25 The hospital staff are never too busy to respond to my personal requests	0.175	0.214	0.238	0.174	0.165	**0.728**
Variance explained (%)	14.8	11.6	9.8	8.1	7.1	5.9
Cumulative variance explained (%)	14.8	26.4	36.2	44.3	51.4	57.3
Cronbach's α	0.887	0.876	0.809	0.748	0.642	0.835

**All numbers, except in the last 3 rows, are factor loadings. NM = needs management; Assu = assurance; Sani = sanitation; Cus = customization; Conv = convenience and quiet; Atten = attention.*

Discussion

The scale developed here for measuring surgical hospitalization service quality was termed SQSH. SQSH included 29 items and covered six key dimensions of surgical hospitalization quality: needs management, assurance, sanitation, customization, convenience and quiet, and attention. The development of a quality scale for surgical hospitalization was the main contribution of this study.

Items measuring needs management (Q13, Q33), and sanitation (Q5) were new to the literature on service quality measurement and contributed to capturing the subtle yet vital characteristics of surgical hospitalization.

Comparison with SERVQUAL and other scales

This section states why the six factors in SQSH were named as such and compares those factors with seemingly similar dimensions in other scales. The first factor of the proposed SQSH, *needs management*, comprised three items: pain management, hospital time policy and other personal needs. Meanwhile, the *empathy* dimension in SERVQUAL by Parasuraman et al[1] indicated the care and individual attention provided to customers. Clearly, these two dimensions are different. Furthermore, the pain management item of the needs management dimension in SQSH exceeded the boundary of the empathy dimension in SERVQUAL, and thus shows the contribution of this study to existing knowledge. Moreover, the second dimension of SQSH, *assurance*, was consistent with SERVQUAL both in definition and items. The importance of the assurance dimension has been emphasized in the context of hospital management.[9,12] This study once again demonstrated that assurance is crucial in hospital service.

The third and fifth factors of SQSH, *sanitation* and *convenience and quiet*, resembled the *tangibles* dimension in SERVQUAL and the *hospital and equipment* dimension in the patient experiences questionnaire of Pettersen et al.[11] The dimension of tangibles was identified as a key dimension in the healthcare sector[9,12] and this study identified sanitation and convenience and quiet as the two major benefits patients obtained from hospital tangibles. Health facility was also identified as a relevant dimension.[11] However, hospitalized surgical patients had sufficient mobility, although restrained, to move around the ward and hospital. If sanitation conditions were unsatisfactory, inhospital infections may occur and threaten the health of patients. Thus, hospitalized surgical patients considered sanitation to be an important and independent dimension.

The fourth factor of SQSH, *customization*, indicated flexible responses to individual customer needs,[20] covering more than the definition of the empathy dimension of SERVQUAL. The scale for measuring hospital service quality[9] named the dimension *personal beliefs and values*. However, customization had more meaning than empathy. Surgical patients not only required caring, individualized attention and personal respect, but also required tailor-made services such as customized medical decision and individualized service that exceeded the definition of empathy. Additionally, *communication* was addressed.[11] Communication was only the first step in reaching customization, and the *customization* dimension proposed in this study effectively coped with the trend of relationship marketing practice. Hospitals with tailor-made services had the most chance of winning the approval of patients. *Potential patient loyalty*[21] can become real patient loyalty.

The final factor of SQSH, *attention*, was defined similarly to *interpersonal aspects of care* of the client-perceived quality scale[22] and the responsiveness dimension in SERVQUAL. However, attention factor had interesting differences from those dimensions. Items measuring the attention factor in SQSH emphasized "never too busy to respond", reflecting the consideration for patients of hospital staff. Patients may have needed *timely* attention rather than *prompt* attention (responsiveness), as required in other service industries. Thus, the final factor was named attention rather than responsiveness.

Implications for hospital administrators

This study provided insights for hospital administrators, particularly those managing surgical wards. Six dimensions clarified how surgical patients form their quality perceptions toward wards, staff and surgical departments.

To address the importance of the first dimension, needs management, patient-controlled analgesia (PCA) or epidural analgesia can be applied to reduce or eliminate patient pain. Furthermore, Demerol intramuscular injection requires nurses to operate by post-operation order of p.r.n. (as the situation demands). This method of pain control is considerably pervasive but generally results in patients having to wait because of the heavy workload of nurses and the time required for injection preparation. The waiting time for patients in pain may be perceived to be considerably longer than it really is. Consequently, PCA or epidural analgesia is suggested as a way of controlling patient pain, that is, to meet the urgent needs of patients.

The second dimension, assurance, involves the ability of the staff to inspire trust and confidence. Through proper and purposeful training, staff not only execute their professional tasks but also *appear to be* working professionally. Additionally, the need for a sincere personality should be addressed during the personnel recruiting process. Having the right personnel alone cannot guarantee the provision of sincere service. Careful design and maintenance of appropriate job loading can leave staff with sufficient time and energy to care for patients sincerely and inspire patient trust in the hospital.

Both patients and hospital administrators care about sanitation, the third component of service quality. Sanitation should be achieved and maintained in areas as small as meal plates and as large as hospital appearance, from internal wards to external parking lots. Low levels of sanitation increase the chances of infection. Sanitation is not merely a requirement for beds and rooms, but also for nursing stations, wards, hospitals and the surrounding environment. Patients, particularly those staying in surgical wards, are still sufficiently mobile to move around and exercise for physical health and psychologic relief. Subsequently, it is possible for them to be infected both inside and outside the hospital.

The fourth dimension, customization, fits the relationship marketing concept and clearly displays the property of surgical hospitalization other than internal medicine. Surgical patients wish to participate in the decision-making process regarding their operations because the operation can change their appearance (scars) or lifestyle (requiring rehabilitation) for several months or even the rest of their lives. Although patients are frequently considered to have insufficient knowledge to participate in medical decisions, patients are the ones who will bear nearly all of the outcomes, favorable or otherwise. It is suggested that physicians should actively involve patients in decision-making regarding treatment or operations. Such an approach can both improve perceived service quality and reduce the risk of physician–patient conflict.

Additionally, a check list including personal preferences is also helpful. Understanding patient preferences in terms of diet, room size, sensitivity to sound, room view, religion and service expectations enables tailor-made services. To utilize information technology, patient preferences can be filed and analyzed using computers. Patients whose preferences are remembered and met will be surprised by the high quality of the services provided.

To improve patient perceptions of convenience, the fifth quality dimension, clear and multilanguage signs are essential. Moreover, it is suggested that a list of objects and corresponding quantity that are required during a hospital stay should be issued to patients upon confirming the time of the surgery. This simple list is inexpensive but can markedly improve patient convenience.

Although patients are generally considerate to nurse work loading and the need for nurses to prioritize different tasks, providing prompt *response* (or online problem-solving) via the room telephone seems indispensable for demonstrating *attention*, which is the final quality component. *On-time* problem-solving is best appreciated by

patients. However, if only *in-time* service is available, a timely response can correct patient perceptions regarding service quality.

Research limitations

One limitation of this study is that it was based on samples in one hospital. Thus, the results of this study should be used with caution. While the purpose of the study was to develop and revise original instrument, the generalizability needed to be compromised with feasibility. Using a sample from multiple hospitals can be the next step to support the findings of this study.

This study included items in the questionnaire of Lin and Chiu[13] in the original item pool. Their questionnaire had considered the validity of questionnaire translation. This study further included other items from four sources (previous studies, scholarly opinions, interviews with nurses, complaints from patients) and slightly modified all items to fit the research context. After this stage, items in the questionnaire were in Chinese except those shown on the manuscript. Thus, direct assessment of questionnaire translation validity (from Chinese to English) was not checked. The Chinese version of the scale is available upon request made to the first author.

This study was not permitted to collect the data of patients in cardiac surgery, thoracic surgery, neurosurgery and breast surgery for patient health and privacy concerns, which is another limitation of this study. However, six surgeries covered in this study were common in several medical centers and thus exhibited sufficient representativeness of the sample.

This study used proportionate stratified random sampling to ensure the sample representativeness by procedure. However, the complete demographic data of all surgical patients were unavailable. Thus, this study could not compare the demographics of sampled patients and all surgical patients, showing one research constraint of this study. Future studies should aim to use complete demographic data of their study population to further confirm the representativeness of their sample.

This study did not hold focus groups of surgical patients because not fully recovered patients tend to have low motivation to join focus groups. On the other hand, fully recovered patients supposedly remember few details about their hospital stay.

This study focused on exploring the actual dimensions of SQSH and found that nine items measured assurance while only two items measured attention. Future research on scale development should ideally seek for an equal number of items for each dimension.

Future research directions

Future research on service quality can apply the SQSH scale to link with utilization intention and patient loyalty or attempt to develop a hospitalization quality scale for internal medicine and other specialized hospital departments. Further exploration of how patients assess each heterogeneous hospital service also offers a fruitful future research direction.

Including other logically influential factors (e.g. patient gender, patient personality, hospital staff personality, tenure of hospital staff, matching of demographic attributes or personality traits) may lead the quality research to include further interdisciplinary insights.

Outcomes of medical services may have externalities on multiple parties. This study adopted the patient-centered approach and thus those externalities were not covered by this study. Future studies may explore externalities of medical service outcomes and their impact.

Most patients may regard themselves as incapable of evaluating operational outcomes. Thus, this study did not measure operational outcomes evaluated by patients, showing one limitation of this study. Future research can measure operational outcomes and explore the influence of operational outcomes on patients' perception of hospitalization service quality.

Assessing quality of service provided by doctors, nurses and clinical laboratory scientists is also an important issue for hospital administrators. Thus, future research can develop scales

for measuring the quality of service provided by doctors, nurses and clinical laboratory scientists.

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