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Development and Validation of Survey Instrument for Measurement of Hospital Functional Service Quality

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ABSTRACT

Background: Emergency, diagnostics, and surgical services are critical areas of hospitals both in terms of technicalities and resource creation. The literature review reflects that there is a need to develop a survey instrument-based measurement model that can identify areas of functional service quality within hospital facilities based on patients' perspectives as hospital quality improvement initiatives.

Objective: To design and validate an instrument that helps to evaluate the functional service quality of hospitals using structural equation modeling**.**

Methods: It was a mixed-method research having a cross-sectional study design. A total of 817 responses were purposively collected from consumers of surgical, emergency, and diagnostic departments of tertiary care hospitals. Simple descriptive, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was performed to identify the factors to formulate the instrument using SPSS Amos 20.0

Results: The study validated seven constructs for the development of Func.Qual (Survey instrument named to measure hospital functional service quality). Amongst these constructs' assurance, responsiveness communication, and reliability are critical contributing factors reported earlier. Whereas promptness, food and aesthetics are new constructs extracted in local settings. The values of goodness of model fit indices found statistically valid with Comparative Fit Index (CFI=0.96), Root Mean Square Error of Approximation (RMSEA=0.055) and Standardized Root Mean Square Residual (SRMR=0.05).

Conclusion: Func.Qual is a powerful survey instrument to measure hospital functional service quality. The current study is an effort to enrich the literature associated with the body of knowledge for hospital functional service quality.

Key Words: Service Quality, Func.Qual, Hospital, Survey Instrument

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INTRODUCTION

The increase in population has increased the demand for healthcare services worldwide.[1] Amongst them, the biggest challenge in the era of innovation is to deal with heavy disease burden and continually improve the quality of life in the associated communities. So, as the variation in the consumer's demand the services offered need to be radicalized,[2,3] this results in improved organizational productivity.[4] Furthermore, the variation also exists between inter-specialty and intra-specialty because of the uniqueness of

associated illnesses and their corresponding treatment modalities.[5,6] Hence it possesses mainly two types of consumers, one is termed internal consumer and the other is external consumer. The former includes surgeons, physicians, pharmaceutical staff, nurses, and other allied health professionals while the latter includes patients.

The internal consumer possesses proficient knowledge of health care while the external consumer is less aware of medical procedures and protocols. Therefore, it is very important to know how they perceive the services rendered to them and what kind of word of mouth is being conveyed in the community about the hospital services.[7,8,9] As the competition is intense in the market, therefore, there is a need to develop such instruments that can help hospitals to assess the functional aspect of services.

Functional service quality is the term that explains how services are delivered to patients. Consumers (patients) in hospital settings usually critically evaluate how services are given to them like hygiene, health care provider's attitude, cleanliness, nutritive value of food, and physical facilities. Therefore, in this study, keeping in view the complexity of consumer behavior (patients), we identified a need to develop such a comprehensive measurement model that can manage the plethora of patient care. Hence the study was conducted to design and validate an instrument that helps to evaluate the functional service quality of hospitals using structural equation modeling**.**

METHODS

Ethical approval was taken from the ethical research board of Sheikh Zayed Medical Complex, Lahore, Pakistan (IRB # 1387-1388, issued on 27.02.2016).

It was a cross-sectional study based on mixed-method research conducted to design and validate an instrument for the measurement of hospital functional service quality. Written informed consent was obtained from respondents (patients).

The study included three distinct phases; one is to conceptualize the survey instrument (based on literature review, focus group) the second is to administer this instrument to local settings, and the third phase is its validation using statistical methods.

1.0 Survey Instrument Development

This critical phase was carried out by employing the following steps. Initially, a literature review was conducted. Earlier reported baseline of 142 items were extracted from the pool of studies that either have used SERVQUAL[1,9] and/or a modified version of SERVQUAL (See Table i, supplementary material).The second step was to conduct a focus group as proposed by Morgan.[10] These baseline 142 extracted items were shared with the members of a focus group. Only one Focus group was conducted whose members were comprised of four practitioners, four senior healthcare providers, and four patients who were either graduates or more qualified to bring conceptual rigor. The session was transcribed, codes were generated, and themes were formulated. Codes & themes were cross-checked to resolve any conflict if found. These codes were cross-checked for internal validity and to resolve the conflict on codes or themes. This exercise helped to design a concrete list of 52 items each for the expectations and perceptions of respondents (See Table ii, supplementary material). The operational definition of the final conceptualized survey instrument-based dimensions and the derived dimensions are given in (See Table iii, supplementary material).

2.0 Questionnaire preparation and administration

The questionnaire was designed in two languages Urdu and English. To ensure validity of the Urdu version it was retranslated by a bilingual expert from Urdu to English. It possesses a section/part of demographic information and two other segments with 52 questions (items) each related to the measurement of patient's expectations and perceptions. Likert scale was used for assessment

that ranges from strongly disagree (1) to strongly agree (5).

The survey instrument was self-administered in randomly selected 10 tertiary care hospitals (05 Public and 05 Private). 900 out of 1500 survey questionnaires were gathered (56.67% response rate) whereas 83 were excluded due to incompleteness. Only 817 survey questionnaires were further analyzed. After survey instrument self-administration, data was coded and recorded in Microsoft Excel and analyzed earlier using SPSS (Statistical Package for Social Science) ver. 20. and later AMOS ver. 20.

3.0 Instrument validation

Different analytical techniques were used to measure hospital functional service quality dimensions and their validation including descriptive statistics, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and correlation coefficients.[11] Items were checked for internal consistency and it was observed no item possessed a negative correlation with any of the other items. Cronbach's alpha value was calculated against each construct. Items having Cronbach's alpha value ≤ 0.6 or the items in a category, "if dropped, alpha value improved" were also dropped, leaving 49 items behind for further analysis as given in Supplementary material Table iv & v. To ensure that the current instrument is valid or not, we enquired from a group of field experts and practitioners.[12]

RESULTS

Quantitative data analysis of valid responses based on perception minus expectation of data was done.

Sample Profile

The complete sample profile of respondents is given in Table vi (See supplementary material).

Determination of Quality Gap

To determine the quality gap, Perception (P) minus expectation (E) (P-E) was calculated. It was found significantly negative having a p-value ≤0.05. Overall expectation and overall perception were calculated and then the overall P-E value was identified. The details are given in Supplementary material Table vii.

Exploratory Factor Analysis

To reduce the factors, an exploratory factor analysis was conducted on 49 items. Principal component analysis was performed. Sample adequacy and appropriateness were checked by calculating Bartlett's test of Sphericity and Kaiser-Meyer-Olkin measures as shown in Table 1.0.

Table 1.0: Kaiser-Meyer-Olkin (KMO) and Bartlett's Test

Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy		.956
Bartlett's Test of Sphericity	**Approx. Chi-Square**	23983.815
	df	1176
	Sig.	.000

Oblique OBLIMIN rotation method permits correlations among the constructed sets, and in the case of uncorrelated data, rotations produce similar results. In this study, Items that possess factor loadings ≤0.40 were dropped.

Similarly, Items that are loaded on two factors, where one-factor loading is ≥ 0.40 and the other factor loading is ≥ 0.30 were also dropped. This ensured items had the highest factor loadings on one factor. This criterion leads to the dropping of 8 items. Items selected at this stage were used for further analysis of CFA.

Confirmatory Factor Analysis

In order to develop a suitable measurement model Confirmatory Factor Analysis (CFA) was performed. The maximum likelihood method was selected. Model fit indices were observed, which include p-values of Chi-square divided by degrees of freedom (χ^2/ d.f), Goodness-of-fit index (GFI), root mean square error of approximation (RMSEA), comparative fit index (CFI) and Tucker-Lewis Index (TLI).

Factors from the pattern matrix of EFA were built on AMOS graphically. Covariances were inserted.

Table 2.0: Func.Qual's hospital functional service quality dimensions and their respective items

Sr. No.	Dimension Name	Item No.	Item Name
1	Reliability	PE23	The hospital provides its services at the time it promises to do so.
		PE24	When patients have problems, employees are sympathetic and reassuring.
		PE49	I received adequate explanations of any tests I had to undergo.
2	Communication	PE50	I was given adequate information about my health condition.
		PE51	I was given adequate information about my treatment.
		PE9	Employees are polite.
3	Assurance	PE11	Employees are courteous, friendly, and supportive.
		PE13	Patients feel safe in their interactions with the hospital's employees.
4	Aesthetics	PE31	The waiting areas for medication and for the doctor's office were pleasant.
		PE32	I felt a sense of well-being in the hospital.
5	Food	PE36	Meals are tasty and hygienic
		PE37	Meals are adapted to patients' nutritious needs
		PE38	Doctors are responsive to patient's needs.
6	Responsiveness	PE39	Nurses are responsive to patient's needs.
		PE40	The support staff is responsive to the patient's needs.
		PE41	Hospital doctors are willing to help patients
		PE42	Hospital nurses are willing to help patients.
7	Promptness	PE43	The hospital support staff is willing to help patients.
		PE44	Patients receive prompt service from the hospital's employees.
		PE45	Hospital employees tell patients exactly when services will be performed.

Table 3.0: Summary of goodness of fit statistics for the measurement model

Hospital Functional Service Quality		$\chi 2$	d.f	$\chi 2$/ d.f	p-value	CFI	SRMR	RMSEA	Factor Loading	Cronbach's Alpha
		521.45	**149**	**3.5**	**0.000**	**0.96**	**0.05**	**0.055**		**0.93**
Aesthetics	PE31								0.73	0.75
	PE32								0.83	
Reliability	PE23								0.74	0.72
	PE24								0.75	
Responsiveness	PE38								0.84	0.89
	PE39								0.92	
	PE40								0.81	
Assurance	PE9								0.79	0.83
	PE11								0.89	
	PE13								0.70	
Communication	PE49								0.77	0.87
	PE50								0.90	
	PE51								0.84	
Food	PE36								0.83	0.82
	PE37								0.83	
Promptness	PE41								0.77	0.88
	PE42								0.79	
	PE43								0.79	
	PE44								0.77	
	PE45								0.73	

Table 4.0: Summary of goodness of fit statistics for Func.Qual

Func.Qual	χ2	d.f	χ2/ d.f	p-Value	CFI	RMSEA	SRMR	Factor Loading
	657.897	**163**	**4.03**	**0.000**	**0.95**	**0.061**	**0.05**	**0.76**
Reliability								0.97
Communication								0.78
Assurance								0.76
Aesthetics								0.99
Food								1.00
Responsiveness								0.85
Promptness								0.95

Seven runs of item reduction were continued until the goodness of fit model. The cut-off value for factor loading was 0.7 and 0.5 for squared multiple correlations. This left only 20 items finally to construct the final model. This deletion of constructs is not exceptional. In such types of studies, the final instrument might retain one-fifth ($1/5^{th}$) of the original items given in Table 2.0.
The current study found Model fit indices in the acceptable level as shown in Fig i (See supplementary material) and Table 3.0.

The Correlational Marker Technique (CMT) is used for each item to check for common method bias that has been presented in Fig ii (See supplementary material).

Validity assessment of the proposed instrument

Different types of validity are assessed to validate the study instrument like content validity, face validity, convergent validity, and discriminant validity. The content validity of items was ensured by a review of the literature and expert opinion. To ensure face validity, items in each construct were identified from literature having reasonably stringent criteria specified in Table iii (See Supplementary material).

The recommendations suggested by such experts were incorporated. They reassured that items within survey instruments were exactly conforming to the study objectives thus guaranteeing its validity.

Normed Fit Index (NFI) ≤ 0.90 presents strong convergent validity. The results showed shows high convergent validity with an NFI value of 0.94. If Cronbach's alpha is sufficiently ≥ average of its correlations with other variables then it is an indication of discriminant validity, such observations (0.35–0.55) were also observed in the current analysis, as referred in Table viii of supplementary material.

Second-order factor measurement model of hospital functional service quality

The factors/constructs extracted by CFA were analyzed for 2nd-order factor model analysis. This run generated a new instrument termed Func.Qual as revealed in Fig iii (See supplementary material).

It was named Func.Qual due to the presentation of functional aspects of service quality. The threshold value was ≥ 0.7 to validate the model. Neither any dimension deleted nor any item. Indices for the goodness of fit model include CFI (0.95), GFI (0.921), NFI (0.930), and RMSEA (0.061) given in Table 4.0.

DISCUSSION

There is a diversity of survey instruments used in assessing patient perceptions of hospital care.[13] Endeshaw[14] reported that so far consensus on the health care quality indicators/ factor/ dimension has not been concluded to develop any scale in hospital settings. Various scholars have done a tremendous job in identifying them, but because of their Western origin, they are incongruent with the geopolitical, socio-economic, and cultural contexts of the rest of the world. Therefore, it

seems appropriate to advise healthcare establishments to develop their models for measuring their functional service quality.

The most important factor/dimension identified was Assurance. Its sub-dimension "courtesy" was identified as the most critical one. Its focus is on the availability of polite, courteous, friendly, and supportive employees to serve patients. The findings are in line with the previous studies[15,16] that have identified similar kinds of dimensions having the highest gap in hospital service quality. Patients feel secure and safe when employees are courteous in their behavior and they perceive hospitals are meant for their well-being.[17,18]

The second most critical factor was Food. The study[19] supported the findings by stating: "Low expectation level may be the result of previous experience or negative word of mouth communication from family members or friends who, perhaps, had disappointing experiences with the quality of food or the limited choice of food. Inpatients' families sometimes cook or they purchase food from restaurants for their relatives." Therefore, it can be realized that hygienic and patient-need-based food is the cause of happiness among the patients and their families.

Aesthetics is among the new dimensions extracted in local settings that are in agreement with various studies.[17,19] When patients receive services in a pleasant environment, they feel a better sense of well-being and stay loyal consumers. Reliability of services is another critical factor in generating a hospital's positive image[20]. Hospitals should not claim what they are not delivering. The study also reported promptness as another contributing factor. It is the prompt provision of services to patients and telling them when services will be available for them.[21, 22]

The other factor identified is named as Responsiveness. It is based on the employee's attitude towards the provision of services to the consumers. The consumers will automatically shift to the facilities where they will find good quality services. The last construct (factor) extracted is Communication. It is focused on the employee's willingness to answer any question related to consumers' (patients') appropriate information about their health condition, diagnosis & treatment modalities. Such findings have also been identified in literature.[20,21,23] Patients come from diversified geographical areas with diversified cultures, therefore, it's the responsibility of the hospital management to take this factor seriously and initiate patient education programs.

CONCLUSION

Func.Qual is a powerful tool to evaluate hospital service quality in three departments (Surgical, Emergency, and Diagnostics). Its contributory dimensions/ factors include assurance, responsiveness communication, reliability, promptness, food, and aesthetics.

These factors are critical and very important to win patient trust and improve hospital quality services. The ways opted to design a new instrument to measure hospital functional service quality in such a resource-constrained country with a large number of patient's perceptual data is novel in itself.

Limitations of the study

The study was limited to three departments of hospitals only. More departments should also be added to design a comprehensive model that has more generalizability.

Future Recommendations

Qualitative studies should be conducted to understand more about hospital service quality involving more hospitals from urban and rural areas of Punjab, Pakistan.

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REFERENCES

1. Ali J, Jusoh A, Idris N, Nor KM. Healthcare service quality and patient satisfaction: a conceptual framework. Int. J. Qual. Reliab. Manag. 2024; 41(2): 608-627. doi:10.1108/IJQRM-04-2022-0136
2. Taufik M, Abdat M, Saputra I, Usman S, Maulana T. Analysis of the influence of service quality on the brand image of sakinah general hospital lhokseumawe, Indonesi. Int. res. j. pharm. med. sci. 2024 7 (1): 72-75.
3. Gronroos C. A service quality model and its marketing implications. EJM. 1984; 18(4): 36-44.
4. Shabbir A, Malik SA, Malik SA. Measuring patients' healthcare service quality perceptions, satisfaction, and loyalty in public and private sector hospitals in Pakistan. Int. J. Qual. Reliab. Manag. 2016; 33(5): 538-557. doi:10.1108/IJQRM-06-2014-0074
5. Ibrahim MS. Validating service quality (SERVQUAL) in healthcare: Measuring patient satisfaction using their perceptions in Jordan. J. Inf. Knowl. Manag. 2020; 19(01): 2040021. doi:10.1142/S0219649220400213
6. Ramli AH. Patient satisfaction, hospital image and patient loyalty in West Sulawesi Province. Business and entrepreneurial review. 2017; 17(1): 1-4.
7. Shafiq M, Naeem MA, Munawar Z, Fatima I. Service quality assessment of hospitals in asian context: an empirical evidence from Pakistan. Inquiry. 2017; 54: 46958017714664.doi:10.1177/0046958017714664.
8. Amankwah O, Choong WW, Boakye-Agyeman NA. Patients satisfaction of core health-care business: the mediating effect of the quality of health-care infrastructure and equipment. J. Facil. Manag. 2024; 22(3): 365-381. doi:10.1108/JFM-12-2021-0154
9. Fatima I, Humayun A, Iqbal U, Shafiq M. Dimensions of service quality in healthcare: a systematic review of literature. Int J Qual Health Care.2019; 31(1):11-29.doi:10.1093/intqhc/mzy125.
10. Morgan DL. Focus groups as qualitative research. Sage publications; 1996.
11. Lamm KW, Lamm AJ, Edgar D. Scale development and validation: Methodology and recommendations. J. int. agric. ext. educ. 2020; 27(2):24-35. doi:10.5191/jiaee.2020.27224
12. Busby M, Matthews R, Burke FJ, Mullins A, Schumaker K. Long-term validity and reliability of a patient survey instrument designed for general dental practice. Br Dent J. 2015; 219(7): 337-341; discussion 342. doi: 10.1038/sj.bdj.2015.749.
13. Castle NG, Brown J, Hepner KA, Hays RD. Review of the literature on survey instruments used to collect data on hospital patients' perceptions of care. Health Serv Res. 2005; 40 (6 Pt2): 1996-2017. doi:10.1111/j.1475-6773.2005.00475.x.
14. Endeshaw B. Healthcare service quality-measurement models: a review. J. Health Res. 2021; 35(2): 106-117.
15. Ibrahim MS, Ahmed MS. SERVQUAL reliability and validity a pilot study to evaluate patients' satisfaction in the Jordanian hospitals. Int. Manag. Rev. 2019; 15(1): 56-67.
16. Andaleeb SS. Service quality in public and private hospitals in urban Bangladesh: a comparative study. Health Policy. 2000; 53(1): 25-37. doi:10.1016/s0168-8510(00)00077-4.
17. Zarei E, Daneshkohan A, Pouragha B, Marzban S, Arab M. An empirical study of the impact of service quality on patient satisfaction in private hospitals, Iran. Glob. J. Health Sci. 2015 ;7(1):1. doi: 10.5539/gjhs.v7n1p1
18. Dagger TS, Sweeney JC, Johnson LW. A hierarchical model of health service quality: scale development and investigation of an integrated model. J. Serv. Res. 2007; 10(2): 123-142. doi:10.1177/1094670507309594
19. Kilbourne WE, Duffy JA, Duffy M, Giarchi G. The applicability of SERVQUAL in cross-national measurements of health-care quality. J. Serv. Mark. 2004; 18(7): 524-533. doi:10.1108/08876040410561857
20. Andaleeb SS. Public and private hospitals in Bangladesh: service quality and predictors of hospital choice. Health Policy Plan. 2000; 15(1): 95-102. doi: 10.1093/heapol/15.1.95
21. Andaleeb SS. Service quality perceptions and patient satisfaction: a study of hospitals in a developing country. Soc. Sci. Med. 2001; 52(9): 1359-1370. doi: 10.1016/s0277-9536(00)00235-5.
22. Altuntas S, Dereli T, Yilmaz MK. Multi-criteria decision-making methods based weighted SERVQUAL scales to measure perceived service

quality in hospitals: A case study from Turkey. Total Qual. Manag. Bus. Excell. 2012; 23(11-12): 1379-1395. doi:10.1080/14783363.2012.661136
23. Akter MS, Upal M, Hani U. Service quality perception and satisfaction: a study over sub-urban public hospitals in Bangladesh. J. Serv. Res. 2008:125.

AUTHORS' CONTRIBUTIONS:

IF: Conception of study, drafted the work, Statistical analysis, data acquisition, and approved final version to be published

MS: Designed study, drafted the work, literature review, and approved final version to be published

AH: Designed study, reviewed it critically for important intellectual content, approved the final version to be published

All Authors agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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