

HEALTHQUAL: a multi-item scale for assessing healthcare service quality

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Abstract The purpose of this study is to examine the measurement dimensions of healthcare service quality proposed in previous studies, quality awards, and service quality accreditation and/or certification systems in the international community. Based on this review, a comprehensive set of healthcare service quality (HEALTHQUAL) measurement items is derived focusing on care processes and results. Thus, the study investigated priorities among the nine measurement items identified through 368 patients and 389 public respondents in South Korea. The results show that the degree of care improvements (26.55 %) was rated as the most important and the second was tangibles (19.82 %) by both groups. The proposed measurement items for HEALTHQUAL were tested using data collected from 385 patients and 251 public respondents at a hospital with more than 500 beds in South Korea. The proposed HEALTHQUAL model consisted of the following five components: empathy, tangibles, safety, efficiency, and degree of improvements of care service.

Keywords Healthcare service · Priorities of healthcare service quality · Healthcare service quality (HEALTHQUAL)

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1 Introduction

The healthcare service quality (HCSQ) has the various dimensions based on expected service and the degree of patient reactions after service because the patients and/or potential customers evaluate experiences based on their expectations vis-à-vis the actual quality of service (Lee et al. 2012). Also, HCSQ depends on many contingent events during the treatment processes and results. While the processes are provided by employees (doctors, staffs, etc.), the results are obtained by the condition of the patient after treatments. Therefore, these two aspects are evaluated differently by the patient. In addition, since the degree of what the patient feels before and after the treatment varies, the perception of HCSQ may be different for each patient.

HCSQ introduced by Myers (1969) has been measured with several dimensions in previous studies (e.g., Donabedian 1980; Vuori 1982; Bowers et al. 1994; Jun et al. 1998; Shelton 2000). However, measurement items of HCSQ have since evolved and modified by the various researchers based on their study purposes (e.g., Bowers et al. 1994; Scobie et al. 2006; Evans and Lindsay 2009; Lee et al. 2011, 2013).

A number of healthcare institutions and/or international accreditation and certification systems have also introduced different quality measurement items. The accreditation and certification for the healthcare service are variously classified and evaluated. For example, Joint Commission International (JCI), the principal accreditation agency for healthcare, evaluates care treatment subjects, human resources, and hospitals to help ensure a safe environment for patients, staff, and visitors. JCI provides accreditation or certification if a hospital meets or exceeds on a set of standard requirements that JCI designed to improve quality of care.

Service quality based on SERVQUAL and SERVPERF refers to an attitude toward the service offered by a service provider resulting from a comparison of expectations and the actual performance (Parasuraman et al. 1985, 1988; Cronin and Taylor 1992). However, SERVQUAL model developed by Parasuraman et al. (1988) measures the comparison between the customer's expectations before and after the service delivery. On the other hand, the SERVPERF model suggested by Cronin and Taylor (1992) focuses on performance measures based on the customer's perceptions. Thus, SERVQUAL can directly measure both expectations and perceptions, whereas SERVPERF can only measure perceptions including performance by the customers. It is vital for the healthcare organization to have accurate information about the patient's expectations to satisfy not only the customer's requirements but also that of accreditation and certification organizations (Solayappan et al. 2011). However, accreditation and certification for healthcare services by certain institutions as a third-party perspective, such as external stakeholders (e.g., JCI, ACI), ensure quality care of service providers (hospitals).

If a healthcare organization attempts to receive a healthcare certification, the organization needs to meet a certain level of the criteria that the certification authority uses to measure the quality of service. After the authority evaluates the quality performance of the organization against the criteria and the result is satisfactory, the organization can win the accreditation or certification.

Although previous studies focused on evaluation of HCSQ based on various approaches (SERVQUAL, SERVPERF models, etc.), there is a paucity of research

that used or modified measurement items suggested by accreditation and certification organizations for healthcare service. HCSQ should be considered based on the needs of patients, the criteria of certification organizations, and the capabilities of the hospital providing healthcare services. If HCSQ measures are based on integrated views of patients, a certification authority, and healthcare providers, they can be more objective. Thus, an integrative HCSQ approach that includes measurement items proposed by previous studies and evaluation criteria of accreditation and certification institutions would be valuable.

The proposed healthcare service quality, HEALTHQUAL, will include multi-dimensional quality measurement factors that are appropriate for modern healthcare service. In this study, it is proposed that healthcare service should be assessed using integrated measurement items of three perspectives: the patient, the accreditation agency, and the hospital.

The purpose of the study is to develop a set of new HEALTHQUAL items and suggest efficient operation strategies for improving care. More specifically, this study develops HEALTHQUAL through the following steps:

- (1) Review HCSQ measurement items suggested by previous studies and accreditation/certification institutions.
- (2) Measure the importance of selected HCSQ items.
- (3) Develop new measurement items for HEALTHQUAL using principal component analysis (PCA) and confirmatory factor analysis (CFA) of the items identified in step 2.
- (4) Develop efficient operational strategies for healthcare delivery.

2 Literature review

Donabedian (1980) defined HCSQ as “the application of medical science and technology in a manner that maximizes its benefit to health without correspondingly increasing the risk.” Leebov et al. (2003) referred HCSQ as “doing the right thing and making continuous improvements, obtaining the best possible clinical outcome, satisfying all customers, retaining talented staff, and maintain sound financial performance.” These definitions emphasize that HCSQ is delivered to satisfy customer expectations and needs, and improve care by skilled professional providers. However, HCSQ is difficult to measure depending on the care service process and interactions with patients and providers including characteristics of service and ethical considerations in the healthcare sector.

2.1 Characteristics of healthcare service quality

HCSQ is influenced by employee satisfaction and related with the improvement in patient satisfaction (Babakus et al. 2004; Hau et al. 2016). Satisfaction of employees who have direct contacts with customers is associated with the service quality (Hartline and Ferrell 1996; Lee et al. 2012, 2013). Although the healthcare service is

centered on the patient, there are limitations in the choice of treatments that a patient wants. For example, a patient may want medication rather than an injection, but a dose of medicine might not be the best treatment depending on the condition or disease. Also, because of the burden of high medical costs, using a high-priced medical treatment may be problematic while the patient needs it. Such limitations may lead to not only customer dissatisfaction, but also difficulties in measuring service quality. Especially, the quality measurement items of healthcare are applied and studied differently according to viewpoints and intentions of the researcher as there are no standardized measurement items. Thus, the quality measurement items are applied in various ways depending on the characteristics of care service needed.

2.2 Measurement items for healthcare service quality

Myers (1969), a pioneer of HCSQ, presented accessibility, effectiveness, improvement of care quality, and continuity as items for HCSQ. Donabedian (1980) suggested components of quality measurements as efficacy, effectiveness, efficiency, legitimacy, optimality, acceptability, and equity. Vuori (1982) proposed effectiveness, efficiency, adequacy, and quality improvements of scientific-technical competence as properties of quality care. Parasuraman et al. (1988) suggested following the five dimensions: tangible external factors including the physical facility, equipment, and employees' appearance; reliability related to a fulfillment factor of promise to the patient; responsiveness that is an attitude of medical workers who nurse, care, and provide service to the patient promptly; assurance that provides trust and faith to the patient concerning ability, qualification, and attitude of employees; and empathy that is an item of attention and considerations for each patient as a person. In a study related to the SERVQUAL model, Carmen (1990) proposed six quality items: tangibles, reliability, safety, empathy, convenience, and cost. Bowers et al. (1994) suggested the following as quality items: reliability, responsiveness, communication, accessibility, and understanding and consideration of the patient. Jun et al. (1998) approached quality of healthcare service based on the patient's perceptions and presented eleven dimensions: tangibles, reliability, responsiveness, technology, competence, courtesy, communication, collaboration, caring, accessibility, customer understanding, and patient outcomes.

Lim and Tang (2000) focused on the SERVQUAL model and accessibility factors (e.g., parking facility and location) to measure HCSQ. Mostafa (2005) and Yesilada and Direktor (2010) attempted to measure HCSQ through empathy, reliability, and tangibles based on the SERVQUAL model. Ranjbar et al. (2012) and Kalepu (2014) also studied measurement items of HCSQ using 22-items of SERVQUAL.

Shelton (2000) approached to measuring HCSQ using accessibility, communication, convenience (efficiency), perceived quality, care, and medical facility and equipment (devices). Barden et al. (2002) also presented HCSQ items such as safe environment, effectiveness, patient-centered treatment, adequacy of time, efficient operational management, and construction of medical equipment. According to Scobie et al.' (2006) study, the items to be measured as quality indicators of healthcare service are accessibility, tangibles, efficient costs, values, timeliness,

policy, and implementation to improve quality, understanding the expected value of customers, and capabilities of the hospital.

Evans and Lindsay (2009) introduced HCSQ in the following six dimensions: the disease-centered aspect (qualitative improvement of a disease or condition based on medical procedure or operation); the patient-centered aspect; treatment types-centered aspect (intensive care unit, doctor's office, emergency room, operating room, and support room); function-centered aspect (efficient structure and support); the comprehensive aspect centered (diverse tangibles and the physical environment to delivery); and the expert-centered aspect (professional knowledge, ability, and specialists). The above six dimensions seem to encompass all of the care essentials as a flow of basic requirements, delivery processes, and results after the care service. The Institute of Medicine (IOM), established in 1970, whose aim is "to help those in government and the private sector make informed health decisions by providing evidence upon which they can rely," measured HCSQ using the following six dimensions: safety, effectiveness, patient-orientation, timeliness, efficiency, and equity.

As mentioned above, the dimensions of HCSQ have been suggested and used differently based on the intention of the researcher. Some of the reasons for such diversity in measurement items are as follows: the scope of healthcare services needs different approaches based on the type of disease; the healthcare system is complex as it deals with human lives; and the number of care units or levels depends on the type or condition of the patient (e.g., severity of disease). As shown in Table 1, this study integrates the various measurement items for HCSQ, including those from SERVQUAL-based studies.

2.3 Healthcare service accreditation systems

Healthcare service accreditation is based on the evaluation of the quality of care provided by healthcare providers or institutions, focusing on ability, authority, and reliability based on standardized assessment items (JCI 2008). Various accreditation systems for healthcare organizations provide opportunities to consumers for hospital selection through objective evaluation indicators. In addition, accreditation systems, above all, ensures continuous efforts of healthcare institutions for the patient's safety and quality care.

There are a variety of accreditation systems in the world: Joint Commission International; Community Health Accreditation Program; Accreditation Commission for Health Care Inc.; Health Quality Association on Accreditation; Accreditation Canada International; Australian Council for Healthcare Standards International; Trent Accreditation Scheme; Malaysian Society for Quality in Health; Korea Institute for Healthcare Accreditation, and the like. In this study, three international accreditation organizations that grant accreditation to international hospitals based on their HCSQ measurement items are considered.

The USA developed an international evaluation standard for HCSQ through JCI. The evaluation standard has been implemented at more than 15,000 medical institutions across the world. As of March 2016, 826 hospitals in 62 countries have been granted the accreditation (United Arab Emirates 137, Saudi Arabia 95, China

Table 1 Measurement items of HCSQ

Previous studies	Frequently used measurement items for HCSQ: empathy (1), responsiveness (2), reliability (3), safety (4), tangible (5), timeliness (6), accessibility (7), assurance (8), efficiency (9), effectiveness (10), improvement of care services (11)										
	1	2	3	4	5	6	7	8	9	10	11
Myers (1969)					v		v			v	v
Donabedian (1980)						v			v	v	v
Vuori (1982)						v	v		v	v	
Parasuraman et al. (1988)	v	v	v		v			v			
Carmen (1990)	v		v	v	v				v		
Babakus and Boller (1992)	v	v	v		v			v			
Bowers et al.(1994)	v	v	v				v				
Tomes and Ng (1995)	v	v			v						
Youssef et al. (1996)	v	v	v		v			v			
Jun et al. (1998)	v	v	v	v	v		v	v			v
Kim and Choi (1999)	v	v	v	v	v			v	v		
Lim and Tang (2000)	v	v	v		v		v	v			
Shelton (2000)	v				v		v		v		
IOM (2001)				v		v			v	v	
Barden et al. (2002)				v	v	v			v	v	v
Mostafa (2005)	v		v		v						
Scobie et al. (2006)					v	v		v	v		
Evans and Lindsay (2009)				v	v	v		v	v	v	v
Yesilada and Direktor (2010)	v		v		v						
Ranjbar et al. (2012)	v	v	v		v			v			
Kalepu (2014)	v	v	v		v			v			

56, Thailand 53, Brazil 51, Turkey 49, South Korea 28, Singapore 22, Japan 18, etc.) (JCI homepage). The Accreditation Canada International (ACI) was established in 1960, and it provides the obligatory standard for hospitals to provide actual and effective care quality improvements and safety. ACI focuses on “facilitating sustainable improvements in health services quality and offering practical solutions that acknowledge our clients’ needs and priorities” (ACI homepage). The quality evaluation of healthcare includes various care units of treatments and services with more than 30 standardized items that can improve quality in management of operations, employees, patients, and potential customers. As of March 2016, 132 hospitals in 18 countries have implemented the ACI system.

The Australian Council for Healthcare Standards International (ACHSI) was established in 2005. It was founded to promote HCSQ improvements in Australia. More than 70 medical institutions in 13 countries are currently using the system as of March 2016 (ACHSI homepage). The Quality Healthcare Accreditation (QHA) is a certification institution of England, which was founded to minimize the risk ratio within hospitals. The system considers safety of patients, employees, and people as

the top priority. QHA has been implemented to improve HCSQ in countries such as Hong Kong, the Philippines, and the Arab Emirates.

Table 2 summarizes the scope and HCSQ evaluation items of international accreditation institutions. The HCSQ evaluation criteria of the international accreditation institutions showed that they are intended to ultimately improve the patient's safety and medical treatment of disease.

2.4 Reclassification of evaluation items of accreditation

In this study, we integrated the HCSQ items of JCI, ACI, and ACHSI (Table 2) and categorical measurement items proposed by previous studies (Table 1), as shown in Table 3. The reason for integrating HCSQ measurement items is that the certificate authority measures the abilities, authority, and practices of healthcare organizations in assessing their care service in the various service quality areas. Thus, the assessment is focused on certain quality aspects of the healthcare organization. In this study, we considered HCSQ items of accreditation and certification institutions as the external stakeholders' perspective. Thus, the integrated HCSQ measurement items can be considered as required evaluation items for accreditation and the proposed criteria in previous studies. More specifically, this study presents a reclassification scheme of evaluation items of JCI, ACI, and ACHSI as follows.

Table 2 Scope and item of evaluation for HCSQ by accreditation institutions

Accreditation institutions	Scope and item of evaluation
JCI: USA	Patient evaluation, communication, use of medicines and equipment, infection and, information management, organizational structure, training, rights and ethics, physical environment, quality improvement of expertise and activities, safety
ACI: Canada	Rights of patients, quality improvement, safety, accessibility, maintenance and effective care, improvement of care, equipment, information management
ACHSI Australia	Continuity of care function, infrastructure function (leadership management, human resources management, information management, safe practice and environment, improving performance)

Table 3 Measurement items for HCSQ by accreditation institutions

Accreditation institutions	Frequently used measurement items for HCSQ: empathy (1), responsiveness (2), reliability (3), safety (4), tangible (5), timeliness (6), accessibility (7), assurance (8), efficiency (9), effectiveness (10), improvement of care services (11)										
	1	2	3	4	5	6	7	8	9	10	11
JCI: USA	v		v	v	v	v			v		v
AC: Canada				v	v	v			v	v	v
ACHSI: Australia			v	v	v	v			v		v

In JCI, the safe environment factors for patient treatment are referred to infection control, safety, rights, and ethics. The primary purpose of the hospital infection control is to provide a safe environment by preventing occurrences of the second disease. The timeliness is referred to treating and preventing diseases by using proper medicine and/or equipment with quick care services at the time required. It is the patient's right to receive needed medical treatment services. Thus, the items of proper medicine and equipment used should be regarded as a timeliness dimension. The reliability can be regarded as necessary skills, abilities, and qualifications to provide the proper care service, and the items presented by JCI can include professional and quality improvement activities. The tangibles are referred to external aspects to provide care service such as the use of equipment, technology, and physical facilities. As the efficiency is a factor that involves costs in processes of service delivery, the items included may reduce inconveniences when patients receive services in the hospital through convenient and efficient operational processes. Organizational structure, information management, and employee training and education are key factors for efficient operational processes. The items of the patient's right and communication with staff are important for the empathy dimension. Moreover, as the ultimate goal of healthcare service is prevention and treatment of disease, these items can be considered as the patient's right. Thus, the evaluation items for JCI accreditation are included in HCSQ measurement items, along with some items from previous studies (Table 3).

Healthcare service items presented by ACI were reframed into safety, timeliness (patient's rights), tangibles (medical devices), efficiency (accessibility and information), effectiveness (care and maintenance), and improvements (care, patient's right, and quality). These items were included in the integrated measurement items of HCSQ, along with items from previous studies as shown in Table 3.

ACHSI, which is the certification organization in Australia, presented items to maintain continuity of medical services. These items were also reframed to represent an environment to provide quality medical services and improving operational efficiency including leadership, operations management, human resource management, and information management. The continuity of medical services can be divided into the provider aspect for care services and the patient aspect as the recipient of healthcare. In case of the provider aspect, the following is included proper equipment and a physical environment for providing safe care; skills and qualifications of staff for implementing care service; and the appropriate use of medicine and equipment. In contrast, for the patient perspective, the continuity of medical services can be regarded as the degree of care improvements for prevention and treatment of disease. For example, prevention or complete care of a disease during the treatment can be regarded as the continuity of medical service. Also, improvements in performance can be considered as a factor that results in care treatment. Thus, the evaluation criteria of ACHSI were included in HCSQ measurement items, along with other most widely cited items in previous studies (Table 3). Consequently, the evaluation criteria or care measurement items suggested by international accreditation institutions were re-categorized based on most widely proposed categories in previous studies as shown in Table 3.

3 Measurement items of healthcare service quality

3.1 The relative importance of measurement items for healthcare service quality

As HCSQ is evaluated based on the customer's experiences and expectations, the items of quality that customers consider as important maybe different from what care providers perceive (Kim and Chio 1999; Choe et al. 2012). Kim and Choi (1999) proposed importance priorities of measurement items for HCSQ as follows: reliability (40.6 %), responsiveness (13.0 %), courtesy (9.9 %), safety (9.4 %), and customer understanding (6.3 %). Choe et al. (2012) proposed the importance rankings of measurement items for HCSQ as follows: the degree of care improvements (23.5 %), tangibles (19.3 %), safety (14.9 %), efficiency (13.35), and empathy (10.5 %).

Thus, healthcare organizations need to understand what their customers consider as important factors before deciding HCSQ measurement items a priori. In an effort to develop the most effective quality measurement items, this study investigated the importance of HCSQ items, those suggested by previous studies and evaluation criteria of accreditation institutions. Also, to develop HEALTHQUAL with more objective and universal measurement items, two surveys were conducted. In this study, firstly, questionnaire items were developed through a discussion with the director of Quality Improvement (QI) Department of K-hospital, the participating hospital for this study in South Korea. Then we developed two questionnaires: the first was implemented to measure the relative importance of HCSQ items based on responses from (1) outpatients, inpatients, and family members of patients in the emergency room and (2) the public. Then the second questionnaire was executed with HEALTHQUAL measurement items based on the results of the first questionnaire study (Table 4).

The first questionnaire was distributed to outpatients, inpatients, and family members of patients in the emergency room at K-hospital in Korea. The second

Table 4 Ranking of importance on measurement items for HCSQ by patients versus publics

Measurement items	Measurement items importance		
	Patients Ranking (number)	Public Ranking (number)	Total average Ranking (number) (%)
Degree of care improvements	1 (97)	1 (104)	1 (201) (26.55)
Tangible	2 (74)	2 (76)	2 (150) (19.82)
Safety	3 (47)	4 (45)	4 (92) (12.15)
Efficiency	4 (40)	3 (75)	3 (115) (15.19)
Empathy	5 (38)	5 (41)	5 (79) (10.43)
Assurance	6 (33)	6 (19)	6 (52) (6.87)
Accessibility	7 (21)	8 (11)	7 (32) (4.23)
Responsiveness	8 (18)	7 (14)	8 (32) (4.23)
Timeliness	9 (0)	9 (4)	9 (4) (0.53)
Total	(368)	(389)	(757) (100.00)

questionnaire copies were distributed to the public, which include people who were visiting their family members in the hospital as concerned protectors and did not have medical experience during the last 3 months. Participation in this survey was totally voluntary. Five hundred (500) copies of each questionnaire were distributed and we received 392 (78.4 %) from the patient group and 397 (79.4 %) from the public group. The returned questionnaires with incomplete or missing items were removed from the sample. The final sample size was 368 (73.6 %) for the patient group and 389 (77.8 %) for the public group.

The respondents were requested to rank the importance of nine items from ① the highest, ②, ③, to ⑨ the lowest, for the following: empathy, responsiveness, reliability, safety, tangibles, timeliness, accessibility, assurance, efficiency, and the degree of treatment improvement. As the two questionnaires were designed to rank the nine measurement items, the lower ranked items (e.g., ⑦, ⑧, and ⑨) were often left blank. The results are shown in Table 4. The top five (more than 10 %) as shown in Table 4 are degree of care improvement (26.55 %), tangibles (19.82 %), efficiency (15.19 %), safety (12.15%), and empathy (10.43 %). The items with relatively low importance were assurance (6.87 %), accessibility (4.23 %), responsiveness (4.23 %), and timeliness (0.53 %).

3.2 Measurement items for HEALTHQUAL: processes and results

Although the SERVQUAL model by Parasuraman et al. (1988) has been widely used in service fields to measure service quality, many studies also pointed out its limitations (Kahneman and Miller 1986; Iacobucci et al. 1994). For example, as the customer's expectations are usually high, the difference between expected and perceived value/performance is often difficult to obtain (Parasuraman et al. 1991; Babakus and Boller 1992). Also, the value/performance measurement is difficult to derive because expectations are realized simultaneously with consumption or after the experience (Kahneman and Miller 1986; Iacobucci et al. 1994).

The SERVPERF model is introduced to supplement the limitations of performance measurement (Cronin and Taylor 1992). The SERVPERF model evaluates processes of service delivery, which was pointed out as another limitation of the SERVQUAL model as it does not include results after service is provided (Buttle 1996). Evans and Lindsay (2009) elaborated the difficulty of using the appropriate measurements because HCSQ items are modified based on the researcher's viewpoints, and the dimensions of quality used are also different.

Considering the limitations of previous studies, this study developed HEALTHQUAL based on six dimensions by IOM (2001), SERVQUAL, the mixed SERVQUAL model, and measurement criteria of international accreditation institutions. The development steps of HEALTHQUAL items are as follows:

- Step 1 The five dimension items of SERVQUAL, components of the mixed SERVQUAL model, six items of IOM, other items suggested by previous studies, and evaluation criteria of international accreditation institutions were reframed as shown in Tables 1 and 2.

- Step 2 Table 2 was modified as shown in Table 3 based on measurement items of Table 1.
- Step 3 The relative importance of HCSQ measurement items was rated by actual and potential customers, as shown in Table 4.
- Step 4 Measurement items were selected based on the results shown in Table 4.
- Step 5 Table 5 was derived from Tables 1, 3, and 4, with measurement categories divided into two aspects: processes and results. The processes refer to services delivery processes and results refer to outcome of received care treatment. Thus, the processes dimension consisted of empathy, tangibles, safety, and efficiency, while the results dimension included the degree of care improvement.
- Step 6 Each measurement item was reclassified based on previous studies as shown in Table 6.

Table 5 Processes and results dimensions of HEALTHQUAL measurement items

Dimension		Previous studies	Accreditation institutions	The relative importance
Processes	Empathy	Parasuraman et al. (1988), Carmen (1990), Babakus and Boller (1992), Bowers et al. (1994), Tomes and Ng (1995), Youssef et al. (1996), Jun et al. (1998), Lim and Tang (2000), Shelton (2000)	AC, ACHSI, JCI	Kim and Chio (1999), Choe et al. (2012)
	Tangible	Myers (1969), Parasuraman et al. (1988), Carmen (1990), Babakus and Boller (1992), Tomes and Ng (1995), Youssef et al. (1996), Jun et al. (1998), Lim and Tang (2000), Shelton (2000), Barden et al. (2002), Scobie et al. (2006), Evans and Lindsay (2009)	AC, ACHSI, JCI	Kim and Chio (1999), Choe et al. (2012)
	Safety	Parasuraman et al. (1988), Carmen (1990), Babakus and Boller (1992), Bowers et al. (1994), Youssef et al. (1996), Jun et al. (1998), Lim and Tang (2000), IOM (2001), Barden et al. (2002), Evans and Lindsay (2009)	JCI	Kim and Chio (1999), Choe et al. (2012)
	Efficiency	Donabedian (1980), Vuori (1982), Carmen (1990), Shelton (2000), IOM (2001), Barden et al. (2002), Scobie et al. (2006), Evans and Lindsay (2009)	AC, ACHSI, JCI	Kim and Chio (1999), Choe et al. (2012)
Results	Degree of improvements of care services	Myers (1969), Donabedian (1980), Vuori (1982), Jun et al. (1998), IOM (2001), Barden et al. (2002), Evans and Lindsay (2009)	AC, ACHSI, JCI	Choe et al. (2012)

Table 6 Measurement items for HEALTHQUAL: processes and results

Dimensions	Items	Concepts	Detailed measurement items
Processes	Empathy quality aspects	Degree of recognizing the patient's situation during the care treatment by medical staff as an indication of personal interests in individual patients	Polite attitudes of employees Explaining the details Listen to the patient Understand and consider the patient's situation A sense of closeness and friendliness Hospital knows what the patient wants Hospital understands the patient's problems as empathy
	Tangible quality aspects	Degree of securing the best medical staff, advanced medical equipment and technology	Degree of securing advanced medical equipment Degree of securing medical staff with advanced skills and knowledge Degree of convenient facilities Degree of cleanliness of employee uniforms Overall cleanliness of the hospital
	Safety quality aspects	The high level of staff qualification, confidence in providing services, and safe environment for the patient and employees	Degree of the comfortable environment for receiving treatments Degree of efforts for providing a comfortable and safe environment for patients Degree of the hospital environment that is safe from infection Degree of the feeling that doctors would not make misdiagnoses Degree of the feeling that nurses would not make mistakes Degree of confidence about the medical proficiency of this hospital

Table 6 continued

Dimensions	Items	Concepts	Detailed measurement items
	Efficiency quality aspects	Degree of processes and operational efficiency to provide effective services	Attitudes about not using unnecessary medication Degree of efforts for proving appropriate treatment methods Reasonable medical expenses Appropriateness of cost for medical services provided Degree of convenience for treatment procedures Degree of efforts for reducing unnecessary procedures
Results	Quality aspects in the degree of improvements of care services	Degree of medical staff and patients' efforts to improve results of care treatment and prevent disease as continuous improvement activities	Appropriateness of care service provided Recognition and efforts for the best treatment by the medical staff Improvement in medical condition as a result of efforts and treatment by the medical staff Degree of improved patient condition after using this hospital care Degree of explanations to the patient to prevent related diseases Degree of efforts and willingness to prevent disease Improvement of disease through this hospital's treatment Degree of disease prevention and service of free public lectures

3.3 Operational definitions of HEALTHQUAL measurement items

The quality aspect of empathy refers to an attitude of the care provider to serve better quality and have similar emotions with patients during care services. The attitude is a commitment to understand and help patients as well as to personalize the sympathy for patients through showing concerns and attention. The tangible quality aspect refers to the use of equipment and the physical environment to provide proper care services. Previous studies showed that skilled and knowledgeable professionals and advanced medical equipment and technology positively

impact on patient treatment and customer satisfactions (Lee et al. 2011, 2012; Hau et al. 2016). For this study, the aspect of tangible also included the degree of cleanliness of employees and the hospital for providing care service.

The goal of safety quality aspect is to provide a comfortable and safe environment to patients, potential consumers, and employees. When patients visit or use a hospital, if they have uncomfortable feelings about the hospital, they would be concerned as to whether the hospital can provide good quality care services with advanced medical equipment and medicine. Although patients may have only limited choices for hospitals, healthcare organizations should provide care services with modern facilities in a safe environment. In this study, the item of safety including the reliability refers to the level of skilled and knowledgeable staff, confidence in provided services, and safe environmental aspects.

The efficiency quality aspect in the study refers to activities for operational efficiency including supporting activities of the organization, departments, and improvement programs (e.g., education and training, accessibility and offer of information) to provide more convenient service. Also, hospitals should reduce waste and waiting time through simplifying paper work-related procedures. In this study, the quality aspect of efficiency refers to how efficiently a hospital endeavors for improvements of care services, and how much effort it made for appropriate medical cost.

The quality aspect of the degree of improvements in care services refers to a set of activities, such as communication and efforts to achieve effective treatments and to improve the result of care treatment. The improvement of care services as a goal of healthcare service includes continuous improvements of care performance for disease treatment and prevention through efforts of medical staff. It can be achieved by the efforts of two groups (i.e., patient and staff). Therefore, in this study, the degree of improvements of care services is approached through the best efforts of medical staff, suitability of care service, communications with patients, and the result of patients' effort.

As mentioned above, HEALTHQUAL is evaluated by patients regarding care services and results after treatments including the patients' experiences or expectations. Therefore, as HEALTHQUAL can be changed according to the processes of care services and results of received care treatment, they should be more clearly measured to improve patient satisfaction. Consequently, this study developed measurement items of HEALTHQUAL using classifications and detailed measurement contents of care services as shown in Table 6.

4 Research methodology

4.1 Research model for measurement items of HEALTHQUAL

Figure 1 shows measurement items of HEALTHQUAL based on the relative importance of the quality items (see Table 4) derived from previous studies and criteria of international accreditation institutions.

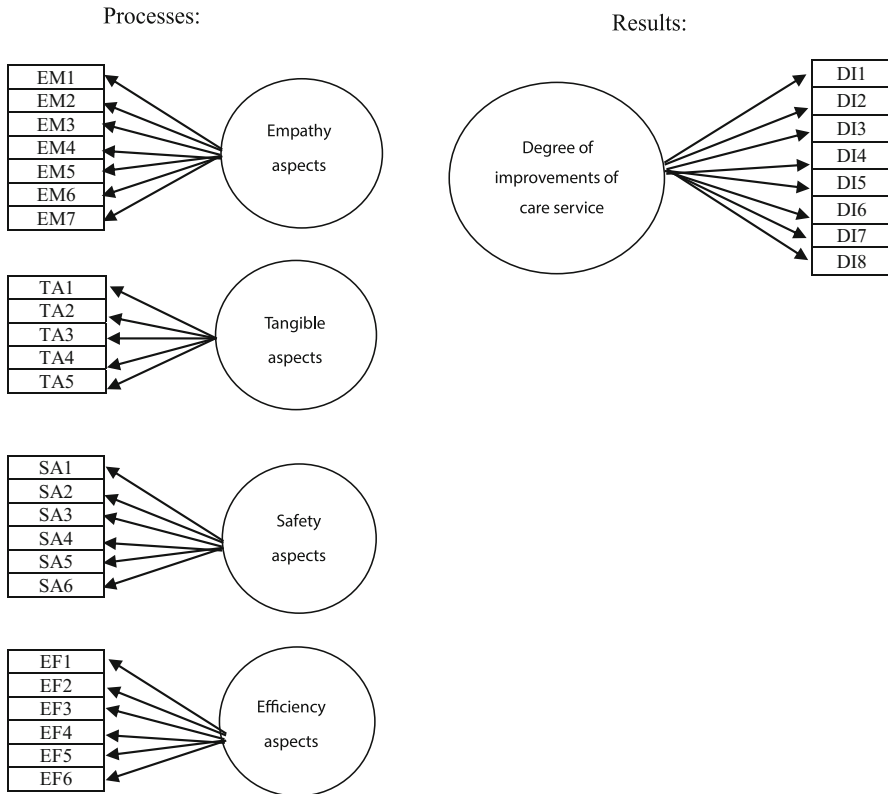


Fig. 1 Proposed measurement items for HEALTHQUAL

As shown in Fig. 1, HEALTHQUAL is divided into two aspects of processes and results. The processes of care service in the healthcare system provide actual or required quality of care and service to patients. When patients and their family members choose a hospital, they usually have certain expectations or perceptions about the quality of care and services offered by the hospital as patients directly or indirectly obtain prior knowledge about the hospital. Also, the results of care treatments can either improve or worsen the patient's condition through the efforts of medical staff and the willingness of the patient.

4.2 Data collection

The Korea Institute for Healthcare Accreditation (KOIHA) was established in 2010 for improving healthcare services and the treatment environment. As of July 2014, 631 hospitals have received the accreditation from KOIHA, and the accreditation trend shows a high rate of growth (KOIHA homepage).

The selected hospital (referred to as K-hospital hereafter) for this study was established in 1971 and is classified as a tertiary hospital with more than 500 beds.

K-hospital has attained the accreditation from KOIHA in June, 2011. Also, the hospital recently has received several certifications as shown in Table 7.

A survey questionnaire was developed through discussion with the director of the quality improvement (QI) department in K-hospital to test the proposed model. A survey questionnaire was developed using the double translation protocol (Harkness 2011). The questionnaire was initially developed in English and then translated into Korean by a bilingual operations management faculty in Korea. The Korean version was translated back into English by an American operations management expert who is also bilingual. The two English versions of the questionnaire had no significant difference.

An initial questionnaire for patients and/or patients' families was tested in a pilot survey involving 30 patients in a hospital in South Korea. The pilot test was undertaken to ensure the participants clearly understood the questionnaire items. Participation in this survey was totally voluntary.

Five hundred copies of the questionnaire were distributed to patients and family members in K-hospital. To collect data from the participating patients, we visited with the inpatients, outpatients, and the family members of the patients in the emergency room who had contacts with a doctor, nurse, or technician. Then, we requested their cooperation in responding to our survey questionnaire. If they agreed to participate, they would fill out the questionnaire in about 15–20 min. If participants requested the researcher to read the questionnaire, we read the items and marked their answers.

For outpatients or their family members, we randomly distributed the questionnaire. For inpatients or their family members, we used the following criteria: (1) their stay in the hospital lasted longer than 7 days but less than 13 days based on the average length of stay (the OECD average was 8.5 days in 2012 while the Korean average was 16.1 days in 2012); (2) they used a multi-patient room (2 or more beds for patients in one room); (3) they were to be discharged next day from the hospital; and (4) terminally or critically ill patients were excluded from the study.

Considering patients of the emergency room is usually terminally or critically ill, we contacted their family members who were at the waiting room. If they agreed to participate, the questionnaire was distributed. However, if they have emergency situations with the patient and the questionnaire was incomplete, then we discarded the questionnaire. We also distributed the questionnaire copies to public, those who

Table 7 K-hospital's characteristics

Location	Seoul, South Korea
Type	Teaching hospital
Classification	Tertiary hospital
Bed	More than 500
Certificates	Healthcare service accreditation in 2011 by KOIHA
Other certificates	AAHRPP (Association for the Accreditation of Human Research Protection Program), 2010 Excellent Endoscope Accreditation, 2012

were just visiting their family members at the hospital and did not receive medical treatment within the last 3 months.

Out of 500 copies of the questionnaire distributed to patients or family members, we received 412 (82.6 %) and also received 273 (54.6 %) of public responses. Those returned questionnaires with incomplete or missing items were discarded. The final sample size was 385 (77.0 %) for the patient group and 251 (50.2 %) for the general public. As shown in Table 8, the majority of hospital customer respondents had experience of receiving medical treatment and/or diagnosis within the past 3 months at K-hospital (64.2 %), while 35.8 % of patients' respondents did not have care experience. It means that 34.2 % of participating customers were first time visitors. Care service areas of customer respondents were outpatient (37.2 %), inpatient (35.3 %), and ER (emergency room, 27.5 %).

4.3 Model variables

The questionnaire utilized 5-point Likert scales to measure the constructs. Scales to measure each of the constructs were developed based on prior studies as much as possible (see Tables 6, 9). Some measures were modified to adapt to this research. The study employed SPSS 17.0 and AMOS 17.0 programs. Table 9 shows the mean

Table 8 Characteristics of respondents

Items	Patients		Public		
	Frequency	%	Frequency	%	
Gender					
Male	167 (43.4 %)	Outpatient	143 (37.2 %)	83	33.1
Female	218 (56.6 %)	Inpatient	136 (35.3 %)	168	66.9
		ER	106 (27.5 %)		
Total	385 (100.0)			251 (100.0)	
Medical experiences within 3 months at this hospital	Yes	247 (64.2 %)		0	0.0
	No	138 (35.8 %)		251	100.0
Occupation					
Homemaker	61	15.9		57	22.7
Student	48	12.5		39	15.5
Office worker	46	12		28	11.1
Professional	34	8.8		27	10.8
Owner-operator	17	4.4		5	2
Public official	37	9.6		17	6.8
Business person	41	10.6		9	3.6
Army	2	0.5		0	0.0
Unemployed	82	21.3		38	15.1
Other	17	4.4		31	12.4
Total	385	100.0 %		251	100.0 %

Table 9 Measurements items and result of reliability test

Dimensions	Component	Measurement variables (Likert type 5-point scale, 1 = very bad; 5 = very good)	<i>M</i>	<i>SD</i>	Cronbach's α
Processes	Empathy	Polite attitudes of employees (EM1)	3.42	0.93	0.943
		Explaining the details (EM2)	3.49	1.01	
		Listen to the patient (EM3)	3.56	1.05	
		Understand and consider the patient's situation (EM4)	3.48	0.98	
		A sense of closeness and friendliness (EM5)	3.38	0.99	
		Hospital knows what the patient wants (EM6)	3.39	0.98	
		Hospital understands the patient's problems as empathy (EM7)	3.39	1.02	
	Tangible	Degree of securing advanced medical equipment (TA1)	3.94	81	0.823
		Degree of securing medical staff with advanced skills and knowledge (TA2)	3.89	0.8	
		Degree of convenient facilities (TA3)	3.67	0.78	
		Degree of cleanliness of employee uniforms (TA4)	3.82	0.84	
		Overall cleanliness of the hospital (TA5)	3.83	0.95	
	Safety	Degree of efforts for providing a comfortable and safe environment for patients (SA1)	3.48	0.95	0.898
		Degree of the feeling that doctors would not make misdiagnoses (SA2)	3.51	1.02	
		Degree of the feeling that nurses would not make mistakes (SA3)	3.5	0.92	
		Degree of confidence about the medical proficiency of this hospital (SA4)	3.41	0.97	
	Efficiency	Attitudes about not using unnecessary medication (EF1)	3.61	0.84	0.858
		Degree of efforts for proving appropriate treatment methods (EF2)	3.61	0.8	
		Reasonable medical expenses (EF3)	3.4	0.86	
		Appropriateness of cost for medical services provided (EF4)	3.4	0.88	
	Results	Degree of improvements of care service	Appropriateness of care service provided (DI1)	3.66	0.78
Recognition and efforts for the best treatment by the medical staff (DI2)			3.65	0.72	
Improvement in medical condition as a result of efforts and treatment by the medical staff (DI3)			3.69	0.77	
Degree of improved patient condition after using this hospital care (DI4)			3.76	0.81	
Degree of explanations to the patient to prevent related diseases (DI5)			3.72	0.8	
Degree of efforts and willingness to prevent disease (DI6)			3.78	0.78	

for each variable ranging from 3.38 (EM5) to 3.94 (TA1) and the standard deviation ranged from .72 (DI2) to 1.05 (EM3).

Reliability was tested based on Cronbach's alpha value (Table 9). All of the coefficients of reliability for the constructs exceeded the threshold value of .70 for exploratory constructs in basic research (Nunnally 1978). In the reliability test, the Cronbach's alpha value for empathy was the highest, .943, and tangible was the lowest, .823. All of the Cronbach's alpha values for the five latent variables were significant at $P < .05$.

For the validity test, principal component analysis (PCA) and confirmatory factor analysis (CFA) were used to identify the most meaningful basis and to identify similarities and differences of the data. Among the measurement items, 32 variables were identified in five components. There were variables with less than .5 loading values: two variables each in safety, efficiency, and degree of improvements of care service (see Tables 6, 9). Thus, these 6 variables were removed from the study.

In PCA with Varimax rotation, the loadings of the items for the five components provided support for the constructs as formulated. The loading values of each factor ranged from .608 to .778. All measurement instruments met the threshold value. Eigen values for empathy, degree of improvements of care service, tangibles, safety, and efficiency were 12.767, 1.905, 1.274, 1.166, and 1.059, respectively. The total percentage of variance explained was 69.89 by the constructs shown in Table 10: empathy (49.103), degree of improvements of care service (7.327), tangible (4.901), safety (4.484), and efficiency (4.073).

The results of CFA can provide evidence of the convergent and discriminant validity of theoretical constructs (Brown 2006). This model consisted of five components: empathy, tangibles, safety, efficiency, and degree of improvements of care service. Statistics of CFAs are shown in Tables 10 and 11. The results of goodness of fit test for the measurement model are summarized in Table 11. Compared to the recommended values for the goodness of fit tests, the values of GFI, AGFI, CFI, TLI, RMR, RMSEA, χ^2 , and the P value were satisfactory, while the value of GFI (.867) was not. Deepen (2007, p. 238) suggested that GFI is desired to be over the value of 0.9, however, "this must not automatically require the model to be rejected." In our model, the majority of fit indices showed good acceptance measures and only GFI is below the required threshold.

All the variables proposed in the study were statistically significant at the .05 level, with the range of standardized factor loadings from .611 to .895. Consequently, fit statistics related with this model confirmed the proposed structure of quality measurements of healthcare service (Table 10). Therefore, HEALTHQUAL can be measured effectively using the five components of empathy, tangible, safety, efficiency, and degree of improvements of care services.

Table 12 presents the construct reliability (CR) and average variance extracted (AVE) of latent variables, while the off-diagonal elements are the correlations between latent variables. For adequate discriminant validity, the square root of the AVE of any latent variable should be greater than the correlation between this particular latent variable and other latent variables (Pavlou and Fygenson 2006). As $CR \geq 0.7$ and $AVE \geq 0.5$ are desirable, all five latent variables showed CR values greater than 0.8 and AVE greater than 0.5. Thus, the convergent validity of these

Table 10 Results of fit indices for PCA and CFA

Independent variables	PCA					CFA					
	Component					Factor loadings	Eigen values	% of variance	Standardized loading	t value	P value
	1	2	3	4	5						
EM1	.835	.218	.252	.257	.153	.835	12.767	49.103	.799	17.330	.000
EM2	.832	.159	.162	.238	.177	.832			.794	17.169	.000
EM3	.896	.317	.187	.272	.225	.896			.893	20.465	.000
EM4	.903	.308	.187	.191	.223	.903			.895	20.509	.000
EM5	.843	.249	.079	.193	.228	.843			.846	18.838	.000
EM6	.853	.210	.171	.231	.243	.853			.825	18.135	.000
EM7	.846	.168	.094	.292	.197	.846			.810	—	—
DI1	.322	.828	.253	.195	.256	.828	1.905	7.327	.803	11.793	.000
DI2	.288	.808	.258	.177	.219	.808			.765	11.412	.000
DI3	.270	.813	.198	.242	.244	.813			.775	11.517	.000
DI4	.343	.815	.222	.258	.261	.815			.785	11.613	.000
DI5	.363	.786	.210	.119	.095	.786			.723	10.962	.000
DI6	.084	.710	.143	.107	.069	.710			.611	—	—
TA1	.061	.304	.787	.219	.328	.787	1.274	4.901	.760	10.805	.000
TA2	.027	.277	.779	.205	.261	.779			.733	10.552	.000
TA3	.316	.186	.743	.247	.036	.743			.679	10.006	.000
TA4	.216	.216	.787	.037	.095	.787			.682	10.045	.000
TA5	.155	.080	.733	.076	.149	.733			.611	—	—
SA1	.370	.136	.214	.816	.132	.816	1.166	4.484	.742	16.265	.000
SA2	.300	.227	.186	.915	.232	.915			.889	21.742	.000
SA3	.313	.247	.165	.875	.201	.875			.837	19.700	.000
SA4	.365	.228	.137	.894	.222	.894			.861	—	—

Table 10 continued

Independent variables	PCA					CFA					
	Component					Factor loadings	Eigen values	% of variance	Standardized loading	t value	P value
	1	2	3	4	5						
EF1	.274	.330	.143	.165	.829	.829	1.059	4.073	.787	14.445	.000
EF2	.283	.383	.175	.082	.862	.862			.822	15.098	.000
EF3	.250	.104	.236	.231	.834	.834			.750	13.729	.000
EF4	.286	.088	.234	.270	.828	.828			.751	—	—

Table 11 Results of fit indices for CFA

	χ^2	<i>df</i>	<i>P</i>	GFI	CFI	TLI	RMSEA	RMR
Measurement model	676.989	2.343	.000	.867	.939	.931	.062	.034
Recommended value				>.9	>.9	>.9	<.08	<.08

CFI comparative fit index, *GFI* goodness of fit index, *TLI* Tucker–Lewis index, *RMSEA* root mean square error of approximation, *RMR* root mean square residual

Table 12 Correlation matrix and average variance extracted (AVE)

Constructs	Empathy	Tangibles	Safety	Efficiency	Improvements of care service
Empathy	1				
Tangible	.605***	1			
Safety	.769***	.584**	1		
Efficiency	.729***	.678***	.675***	1	
Improvements of care service	.774***	.731***	.683***	.748**	1
CR	.953	.879	.909	.895	.925
AVE	.746	.593	.714	.680	.676
Sqrt. (AVE)	.864	.770	.845	.825	.822

CR (construct reliability) = Σ (factor loading²) / [Σ (factor loading²) + Σ (error): more than .7, AVE = Σ (factor loading)² / [Σ (factor loading)² + Σ (error)]: more than .5

** $P < .01$; *** $P < .001$

variables was satisfied. Consequently, discriminant validity and convergent validity were supported for the study as shown in Table 12.

5 Conclusion and limitation

Healthcare organizations need to provide a safe and pleasant treatment environment to not only patients and employees but also to all the customers of the hospital. The care environment should be where patients can feel comfortable and safe for receiving needed services for disease treatments, diagnosis, and prevention. The provider must strive to understand what consumers need or want to meet or exceed their service expectations. Accordingly, healthcare organizations can achieve patient satisfaction by doing things right for quality care that exceeds customer expectations.

This study proposed a set of measurement items for HEALTHQUAL and conducted comparative analyses of quality measurement items based on the type of care service and consumer. The results of the study shed new insights about the relative importance of quality items such as the degree of improvements of care services (ranked 1), tangible quality aspects (ranked 2), efficiency quality aspects (ranked 3), safety quality aspects (ranked 4), and empathy quality aspects (ranked

5). The characteristics of care service could cause different problems for quality measurement items. However, for healthcare organizations that strive to provide high-quality care, the most important factors perceived by patients and the public should be clearly understood. As customers' needs are attainable when providers recognize such needs, organizational leaders must have full understanding and strategies about those quality items that the customers recognize as important.

The results of PCA and CFA for quality items in the measurement model imply that these items might be measured as latent variables. Based on the results, organizations could establish operational strategies through each item including improvement of satisfaction for both customers and employees. Given these results, improving customer satisfaction through medical treatments could be a very difficult task. Nevertheless, if care organizations employ the best method for customized care services, they would be able to attract customers' positive emotions.

The purpose of developing the HEALTHQUAL scale was to provide a diagnostic methodology for objectively evaluating all-encompassing care service quality of hospitals by internal and external customers. The dimensions of HEALTHQUAL include most important criteria for evaluating healthcare providers (public and private, clinics, specialty hospitals, etc.), such as multi-stage care delivery processes, facility and technology, and management systems. As such, the following guidelines may be helpful in ensuring the most appropriate and effective use of HEALTHQUAL by all stakeholders.

- (1) The HEALTHQUAL scale can be used in its entirety as much as possible to measure care quality by both patients (customers) and medical staff/administrators (providers). The patients can use the scale to express their opinions and perceptions of the care they received based on their experiences versus expectations. This information is of great importance to the administrators of the provider concerning how their care services are viewed by the customers. The scale used by medical staff/administrators of hospitals can be viewed as internal self-evaluation of their care quality. A comparative analysis of the two sets of evaluations (customers and medical staff/administrators) can provide much insight about where the hospital should improve in providing better information to the patients, enhance care quality, and/or invest more resources to respond to customers' needs. The patients or potential patients can use the HEALTHQUAL scores of hospitals in their decision making process in selecting the best care provider for treating their current medical issues.
- (2) The HEALTHQUAL scale includes most of the criteria suggested by previous studies and certification organizations. However, the scale items used may need modifications or change over time. Thus, the accumulated data of HEALTHQUAL will be very useful in continuously updating and improving the criteria used to objectively measure healthcare quality by both patients and medical staff.
- (3) The use of HEALTHQUAL can be fruitfully supplemented by additional qualitative and quantitative research to discover key problem care areas in

different care conditions (e.g., different type of diseases, size and type of hospitals, different geographic areas) to customize the scale.

- (4) HEALTHQUAL can serve as an objective framework to conduct comparative studies of care quality performance among hospitals in different environments (regions, countries, ethnic groups, etc.) for continuous improvement in care quality.

Academically, this study contributes to developing healthcare service quality (HEALTHQUAL) measurement items based on literature reviews, empirical studies, and quality criteria of accreditation and certification institutions. First, we analyzed the relative importance about HCSQ items, and then we selected measurement items based on top-ranked items (more than 10 %). Secondly, we proposed operational definitions for measurement items for HEALTHQUAL, and analyzed HEALTHQUAL items using reliability and validity test. Finally, HEALTHQUAL is developed considering the perspectives of patients, service providers, and accreditation agencies to measure HCSQ in service delivery processes.

Generally, healthcare service quality has been measured by other service industry's measurement items chosen from the view of researchers. However, HEALTHQUAL is an integrated model to measure HCSQ based on the patient's view, the hospital view, and the perspective of accreditation institutions.

This study has several limitations. First, data were collected from patients and their protectors in K-hospital in South Korea. Although reliability and validity tests were satisfactory in the study, the generalizability of study results may be limited because only one hospital was selected for data collection. Second, the emergency room patients could not participate in the study, so the questionnaire was filled out by their protectors. Third, predictive validity test in the study was not performed for a group of subjects for a certain construct. Also, a longitudinal study using different time patients was not undertaken.

Future research should consider the limitations described above. Data collections through international certification systems would be an appropriate and effective research approach in the future. The comparative research on quality measurement items could be extended through cross-cultural study samples, including different size and type of hospitals, and also longitudinal analyses of the data. Also, the future study should develop appropriate operational processes for different types of care providers as hospital characteristics tend to require different types of operational processes to provide care services.

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