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Research on Quality Components for Service Design of Health Screening : Focus on IT Services

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Abstract

This research proposes how to enhance low customer satisfaction with health screening services caused by procedural complexity and limits of health screening. The purpose of this study is to identify sub-components of the service quality provided by general health examination centers.

This is a qualitative analysis of in-depth interviews of providers and consumers of medical services. The data were primarily analyzed by affinity diagram, and the data were sorted and analyzed according to the criteria suggested by Donabedian's four components.

Four types of quality factors and the health screening service quality components of 39 subordinate items were assessed.

Components related to the use of IT facilities comprise a significant amount of the physical factors, and there are high demands for IT facilities among customers.

Keywords : Health Screening, Quality Management, Service Design

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1. Introduction

As the service industry develops, the importance of service is accentuated while changes in industrial structure are gradually expanding the field of design. Among other medical services, greater attention is being given to preventive health screening services. This has led to quantitative expansion of these services, especially in large medical institutions, as health screening is directly connected to financial efficiency in the private health screening sector. With numerous examinations and long wait times, health screening services have become increasingly complex and time-consuming, which requires improvement [Kim, 2014].

The quality of medical service includes the degree of satisfaction perceived by customers about the medical service they received; service users feel satisfied with service quality when the service satisfies or exceeds their expectations [Rosenstock, 2005]. The definition of medical service quality varies depending on the researcher, but most agree that it indicates an attitude related to the expectation, perception, and satisfaction of the service experienced during the interaction between providers and users of medical services [Milutinović et al., 2009]. In the preceding studies, factors influencing satisfaction about medical service quality were divided into technological, human service, physical, and procedural [Chang, 2007]. Factors influencing satisfaction can also be divided into physical environment factors and human service factors. The former is subdivided into accessibility, cleanliness, attractiveness, and convenience while the latter is subdivided into expertise, reliability, and responsiveness [Kim, 2010]. Another study analyzed the quality of medical service as constructs of procedure use, human service, and service scape [Kang, 2014]. A previous study [Jin, 2015] investigated the influence of satisfaction with service quality on the behavioral intentions of customers by dividing medical services into factors of interaction, relationship quality, hospital atmosphere, tangibility, operational quality, support quality, and outcome quality.

Unlike general medical service, comprehensive health screening service does not include treatment. Comprehensive health screening service is centered around the physical environment of the examination, human service of medical professionals, procedural service of the examination, and support of the medical organization [Kim et al., 2013]. Within this context, research has classified the components of comprehensive health screening service quality into physical, human, procedural, and supportive factors. Each factor is defined as follows based on preceding studies including Donabedian's [Donabedian, 1980, 1983, 1987, 1990] definition. Physical factors are defined as tangible service factors including the space and facilities provided by the health examination center [Chang, 2005, 2007; Shelton, 2000]. The human factor is defined as respectful attitude, competence, and consideration of service providers in the health examination center, including doctors, nurses, medical engineers, and administrative staff [Chang, 2007; Kim, 2010; Kang, 2014]. A procedural factor designates accurate translation of customer expectations into appropriate health examination services as promised. It includes administrative processes such as reservation, reception, and waiting, as well as the examination process [Chang, 2007; Kang, 2014; Moon et al., 2000]. A support factor is defined as spontaneity and preparedness of the medical organization providing health examination services [Jin, 2015].

This research aims to propose enhancements for customer satisfaction with services that are currently limited by procedural complexity and the limits of health screening. This research will redefine sub-components of the quality of service provided by a general health examination center during the examination process based on the quality factors of medical services proposed in previous research.

2. Methods

2.1 Study Design

This is a qualitative analysis performed through in-depth interviews of providers and customers of medical services to identify sub-components of the service quality provided by general health examination centers.

2.2 Sample

Interviewees consisted of medical service providers and customers. The providers were medical and administrative staff at B center, a health examination center in Seoul. Snowball sampling was used. A total of 10 personnel were interviewed : one specialist each in the internal medicine, radiology, digestive medicine, and family medicine departments, four nurses, one clinic pathologist, and one telephone administration staff person. Customers of these medical services who visited the health examination center participated in interviews. Individual in-depth interviews were conducted with nine customers who received health examination services at A tertiary hospital.

2.3 Data Collection Procedure

Individual interview data of providers were gathered between September 2~24, 2015 while customer data was collected between September 15 and October 2, 2015. The length of individual interviews did not exceed 30 minutes and ambiguous responses were reassessed in telephone interviews to clarify any ambiguities. Efforts were made to meet the requirement for sufficient data reaching data saturation when there was no new additional data.

Open questionnaires for interviews were created with reference to the research of Yoo [2015] and Park [2015], and two copies were prepared for each medical service provider and customer. At the beginning of the interview, respondent demographic data were gathered through casual questions. Respondents were led to talk freely about the health examination services they had experienced as the interviews proceeded. Then, using a semi-structured questionnaire, questions were asked about the service quality factors that customers consider when evaluating their experience with health screening services. In the questionnaire for medical service providers, in-depth interviews were conducted regarding inconveniences for examinees observed during health examination and the demand for improved service. In the questionnaire for customers, interviews focused more on the inconvenience, discomfort, and improvement requirements that arise during the process from reservation to examination and result confirmation.

2.4 Data Analysis

In this research, data were primarily analyzed using the affinity diagram [Kawakita, 1960], which organizes a large number of ideas and data based on their mutual relationships to define or conceptualize services [Korea Institute of Design Promotion, 2012]. After primary analysis with the affinity diagram, resulting data were sorted and analyzed secondarily according to the criteria suggested by Donabedian [1980, 1983, 1987, 1990] : physical, human, procedural, and support factors.

Then, 52 sub-components were validated by seven experts, including three specialists with five years of experience or more currently working in health examination centers, three designers who have worked in promotion or design departments in general hospitals for 10 years or more, and a president of a design institute. The session was conducted for about 90 minutes in a small seminar room and recorded after obtaining consent from the panel. Handouts containing 52 items deduced from the preliminary survey were distributed, and the panel was asked to review components of service quality including the appropriateness of name and classification. Determinations were made to 'adopt,' 'revise,' 'discard,' or 'add' components of the review.

2.5 Ethical Consideration

This research had the following measures in place to protect the rights of interviewees. First, all study participants provided informed consent. The identity of researchers was disclosed, and the interviewees were notified prior to the interview that a smartphone would be used to record the interview. In addition, it was explained that the recorded content would never be used for a purpose other than the current research project. The anonymity of interviewees was guaranteed, and consent was obtained in writing from respondents before proceeding with the research.

3. Results

3.1 Subject Characteristics

Interview subjects were divided into providers and customers of health screening services. The interviewed providers of health screening service consisted of three males and seven females aged 28~45, including doctors, nurses, and administrative staff. The interviewed customers of health screening service were composed of five males and four females aged 20~51 including office workers, businessmen, students, and housewives. Refer to 〈Table 1〉 and 〈Table 2〉 for more details about subjects.

〈Table 1〉 Demographic Information of the Providers of Health Screening Services Interviewed

Gender	Age	Occupation	Work Experience (yrs)	Education
Male	41	gastroenterology specialist	7	Doctor
Female	45	gastroenterology specialist	4	Doctor
Male	37	radiology specialist	4	Master
Female	38	family medicine specialist	4	Bachelor
Female	28	endoscopy room nurse	6	Bachelor
Male	32	endoscopy room nurse	3	Community College Graduate
Female	31	reception desk nurse	6	Community College Graduate
Female	29	radiology room nurse	2	Community College Graduate
Female	29	medical technologist for blood collection	3	Community College Graduate
Female	39	administrative staff receiving phone calls	4	Bachelor

〈Table 2〉 Demographic Information of the Customers of Health Screening Services Interviewed

Gender	Age	Occupation	Education
Male	41	company worker	Master
Female	32	housewife	Bachelor
Female	51	self-employed	Master
Male	33	company worker	Bachelor
Male	40	company worker	Bachelor
Female	20	student	Community College Graduate
Female	37	housewife	Bachelor
Male	29	company worker	Community College Graduate
Male	35	company worker	Master

3.2 Results of Interviews

After items about health screening services were extracted from the data collected from respondents, similar or repetitive items were eliminated and the components of health screening services were identified. These were classified into eight categories, including preparation for health examination, examination environment, examination in general, endoscopy, ultrasound, waiting environment, outcome management, and complaint management, with a total of 59 sub-components.

Based on the four components suggested by Donabedian [1980, 1983, 1987, 1990], service components were classified as four categories with 52 sub-components after secondary classification <Table 3>.

<Table 3> Basic Materials for the Components of Health Screening Service Quality Collected from the Interviews

Division	No	Components of Health Screening Service
Physical Factors	1	monitors displaying waiting information
	2	short distance between examinations
	3	all examinations on the same floor
	4	separation of examination areas for males/females
	5	gallery zone in the corridor
	6	proximity to recovery room and bathroom
	7	secondary recovery room
	8	shower stalls in the dressing room
	9	cleanliness of the bed
	10	check endoscope instrument disinfection room
	11	tv, magazines, and massager in waiting areas
	12	name tags for medical staff with titles (internal medicine specialist 000)
	13	patient gown easy to put on and remove
	14	baskets for personal belongings (cellphones, glasses)
	15	bracelet type RFID navigator to view the examination status
	16	large information map
	17	numbered signs (e.g. blood collection room 3)
	18	result sheet with major results highlighted
	19	readability of endoscopy consent form
	20	video of examination guide provided in waiting area
	21	device information posters
	22	cellphone chargers in waiting area
	23	recognition of the health screening center
Human Factors	24	adequate explanation of examination items when making a reservation on the phone
	25	personal guide accompanying throughout the screening process
	26	medical staff with ability and competence
	27	kindness of medical staff
	28	advance notice of the occurrence of pain by examination
	29	brief explanation of result after examination (endoscopy/ ultrasound)
	30	explain which part being examined during ultrasound
	31	warm ultrasound gels
	32	advance notice of expected waiting time
	33	recognition/celebrity of medical staff

〈Table 3〉 Basic Materials for the Components of Health Screening Service Quality Collected from the Interviews(Continue)

Division	No	Components of Health Screening Service
Procedural Factors	34	easy reservation (securing desired reservation time)
	35	reservation confirmation texts
	36	check medication/medical history
	37	additional examination after consulting preliminary examination doctor
	38	emergency treatment available in the occurrence of complications (bleeding, perforation)
	39	call guardians in emergency
	40	female gynecologist in ob/gyn
	41	sleep quality management during sleep endoscopy preventing the patients from being awake
	42	adequate rest after sleep endoscopy
	43	appropriateness of waiting time
	44	quick confirmation of the result
	45	easy connection to outpatient treatment
Support Factors	46	system reaffirming medical history to the medical staff at the time of examination
	47	parking support service (valet service)
	48	redistribution system of waiting customers to ease congestion
	49	establishing database of the medical history
	50	suggestion of tests based on the database
	51	personalized management: programs for those at risk for chronic disease (smoking cessation/ diet)
	52	dedicated customer response team

3.3 Result of Validation by Expert Panel

The 52 sub-components were validated by seven experts in medical service areas. 〈Table 4〉 provides detailed information.

3.3.1 Physical Factors

For physical factors, 16 items were adopted, six were revised or integrated, and four were discarded. The revised or integrated factors were as follows: three items for 'short distance between examinations,' 'all examinations on the same floor', and 'proximity to recovery room and bathroom' were revised and integrated into 'short distance between examinations and convenience of grasping the structure.' In addition, 'cleanliness of the bed' was expanded to 'cleanliness of the facilities (space, gown, dress for the medical staff, etc.)'. 'Large information map' and 'numbered signs' were revised and integrated into 'numbered signs for check-up rooms and large information map on the wall (e.g. Blood Collection Room 3).' Those factors discarded by the expert validation process were 'gallery zone in the corridor', 'shower stalls in the dressing room', 'device information posters', and 'examination center recognition'. 'Gallery zone in the corridor' and 'shower stalls in the dressing room' were discarded because they are beyond the scope of universal service elements and 'device information posters' was discarded as it was not considered to be a health examination service. 'Examination center recognition' was eliminated because recognition cannot be regarded as a service factor, as examination centers include a range of institutions from private clinics to general hospitals.

〈Table 4〉 Finalized Components of Comprehensive Health Screening Service Quality

Division			Description
Physical Factors	Space	1	Efficiency of examination space organization and moving lines
		2	separation of examination areas for males/females
		3	Provision of amenities in waiting areas (TV, magazines, massager, etc.)
		4	Provision of secondary recovery room
	Convenient Facilities	5	Provision of baskets for personal belongings (cellphone, glasses)
		6	Provision of cellphone chargers in waiting areas
		7	Easiness of putting on and removing patient gown
	Safety Facilities	8	Check disinfection of endoscopy devices
		9	cleanliness of the facilities (space, gown, dress for the medical staff, etc.)
	Information Facilities	10	Can the examination status be referred to instantly (using portable electronic device, etc.)?
		11	Is waiting information visually provided? (displayed on the monitor, etc.)
		12	Is the sings for check-up rooms and information map on the wall (e.g. Blood Collection Room 3) readable?
		13	Are major results in the result sheet highlighted?
		14	Is the endoscopy consent form readable?
		15	Is the video of examination guide provided (in waiting areas or endoscopy room)?
		16	Is the position specified in the name tag (internal medicine specialist 000)?
Human Factors		1	Is examination information adequately explained (when making reservation on the phone)?
		2	competence and recognition of medical staff
		3	kindness of medical staff
		4	Is advance notice (of waiting time/occurrence of pain) provided?
		5	Is explanation provided during ultrasound (which part being examined)
		6	Is brief explanation of the result after examination (endoscopy/ultrasound) provided?
		7	Is warm ultrasound gel applied?
Procedural Factors		1	easy and precise reservation (securing desired reservation time and sending reservation confirmation texts)
		2	Is medication/ medical history checked?
		3	Is additional examination after consulting preliminary examination doctor available?
		4	Is emergency treatment and response available in the occurrence of complications (bleeding, perforation, shock, etc.)?
		5	Is female gynecologist available in ob/gyn?
		6	Is the quality of sleep endoscopy (maintaining sleep during endoscopy and adequate rest after the procedure) being managed?
		7	Is hygiene thoroughly managed to prevent infection?
		8	Is waiting time for examination appropriate?
		9	Is it possible to check the result quickly?
		10	Is it easy to connect to outpatient treatment?
Support Factors		1	Is the medical examination history database established to notify medical staff and suggest required tests?
		2	Is parking support (valet service) available?
		3	Is redistribution system of waiting customers to ease congestion available?
		4	Is porridge/ meal provided after examination?
		5	Is personalized management programs (for smoking cessation, diet, exercise, etc.) available based on the result?
		6	Is there a dedicated customer response team?

3.3.2 Human Factors

For human factors, seven items were adopted, five were revised or integrated, and one was discarded. Factors that were revised or integrated are as follows : 'medical staff with ability and competence' and 'recognition/celebrity of medical staff' were revised and integrated into 'medical staff with competence and recognition'. In addition, 'notice of expected waiting time' and 'notice of occurrences of pain by examination' were revised and integrated into 'advance notice of examination (waiting time/occurrence of pain)' and 'organization' was replaced by 'part'. Among human factors, 'personal guide accompanying throughout the screening process' was discarded ; although some experts wanted it adopted, most disagreed because the service would be too expensive, limited to the aged population, and inappropriate for expansion to a universal service.

3.3.3 Procedural Factors

For procedural factors, 10 items were adopted, six were revised or integrated, and none were discarded. Factors that were revised or integrated are as follows : 'easy reservation (securing desired reservation time)' and 'reservation confirmation texts' were integrated into 'easy and precise reservation (securing desired reservation time and sending reservation confirmation texts).' In addition, 'emergency treatment available in the occurrence of complications (bleeding, perforation)' and 'call guardians in emergency' were integrated into 'emergency treatment and response in the occurrence of complications (bleeding, perforation, shock)' while 'sleep quality management during sleep endoscopy preventing the patients from being awake' and 'adequate rest after sleep endoscopy' were integrated into 'quality management of sleep endoscopy (maintaining sleep during endoscopy and adequate rest after the procedure)'.

In the process of validating procedural factors, diverse expert opinions were presented. There was agreement on the addition of 'thorough hygiene management to prevent infection', citing a MERS outbreak that paralyzed health examinations in domestic medical institutions for several months.

3.3.4 Support Factors

For support factors, six items were adopted, four revised or integrated, and none were discarded. 'System reaffirming medical history to the medical staff at the time of examination', 'establishing database of the medical history,' and 'suggestion of tests based on the database,' were revised and integrated into 'establish the medical examination history database to notify medical staff and suggest required tests'. Also, 'personalized management : programs for those at risk for chronic disease (smoking cessation/diet)' was revised to 'personalized management according to the result : smoking cessation, diet, and exercise programs.'

The panel also proposed addition of 'supply soup/meal after examination', citing health screening centers where porridge or a meal are provided to prevent hypoglycemia due to prolonged fasting after finishing the examination process.

4. Discussion

As a result of the research, a total of 39 components of service quality were drawn under four categories of physical (16), human (7), procedural (10), and support (6) factors.

Sixteen physical factors consist of four categories; space (4), convenient facilities (3), safety facilities (2), and information facilities (7). This result differs from suggestions of previous studies regarding screening facilities and the environment [Kim and Ryu, 2001]. According to a previous study [Kim and Ryu, 2001], excellent facilities and services are reasons to use health screening service centers in universities. Well-equipped facilities influence a customer's intent to revisit a health screening center. However, this study revealed that in addition to good service, information should be provided using IT to save time and improve the quality of the health examination experience. Components related to the use of IT facilities, comprised by many of the physical factors, indicate a high demand for IT facilities among customers. A number of inquiries reflect the IT-based information needs of customers in the health screening environment, including 10. 'Can the examination status be referred to on the spot (using portable electronic device)?', 11. 'Is waiting information visually provided? (displayed on the monitor)' 15. 'Is the video of examination guide provided (in waiting areas or endoscopy room)?'. The results revealed that users of health screening services want to immediately check their examination status and confirm information about the next process while waiting.

Ten human factors were identified. The skills and explanations of medical and administrative staff responsible for the examination process are important criteria for the level of kindness. This finding is in line with the suggestions of a previous study [Kim and Ryu, 2001] that the kindness of employees influences customers' intentions to revisit a health screening center. In addition, Pini et al. [2014] stated that the most important factor for outpatients was trust between doctors and patients. This implies that kindness of medical and administrative staff is important for both users of health screening services and outpatients.

As for procedural factors, 12 service components were identified throughout the examination process, from reservations to preliminary examination to examination to dealing with an emergency and connecting to outpatient treatment. According to Gang's [Kang, 2014] study, procedural factors of the health screening service influenced customer loyalty, in line with the results of this study. In particular, Gang suggested that service systems must be computerized to improve delays in waiting time. This indicates that it is crucial to introduce and implement IT-based system management for greater efficiency in procedural factors of the health examination service.

Six items were identified as support factors, and there is a need to [1. establish the medical examination history database to notify medical staff and suggest required tests]. As more company workers and general users undergo health screenings on a regular basis there appear to be emerging needs of users to review the past examination history and personalize examinations based on their health issues. To meet patient demands of health examination organizations, IT-based databases should be considered that share examination history from other organizations under user consent.

This research conducted in-depth interviews of both providers and customers of health screening services to identify over 60 components of service quality. Collected data were analyzed using an affinity diagram and classified into four categories (physical, human, procedural, and support factors) with 52 subcomponents. As a result of the FGI test con-

ducted by a panel of seven medical professionals, the final 39 components of service quality were identified. Components related to the use of IT facilities comprise a significant amount of the physical factors, and there are high demands for IT facilities among customers. Users of health screening services want to check their examination status immediately through portable electronic devices or monitors to confirm information about the next examination process while waiting. The components of health screening service quality drawn from this research will be used as a basis for composing questionnaire items to improve the quality of comprehensive health screening services in the future.

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