ISSN (Print): 0974-6846 ISSN (Online): 0974-5645

# A Study on the Effects of Risk and Uncertainty of Information on Service Quality Assessment with Focus on Cancer Patients' Cases

InheeYoun<sup>1\*</sup>, Seungbaum Kim<sup>2</sup>, Lee Yoon Hyeon<sup>1</sup>, Lee Yun Seok<sup>1</sup> and Hee Tae Chung<sup>1</sup>

<sup>1</sup>Department of Health Administration, Namseoul University, Republic of Korea; inheey@gmail.com, skylee@nsu. ac.kr, yslee@nsu.ac.kr, ceochung@nsu.ac.kr

<sup>2</sup>Division of Business Administration, Graduate School, Ajou University, Republic of Korea; kimsb@ajou.ac.kr

#### **Abstract**

Background/Objectives: Even though the required service content or evaluation would be different depending on the circumstances such as the level of risk of cancer, the degree of uncertainty in the information during the treatment stage, etc., hospitals tend to provide a uniform service. Purpose of the research is to suggest an effective healthcare service model for each context. Methods/Statistical Analysis: Survey and the corresponding analysis were carried out on 286 cancer patients at cancer centers of the 7 university hospitals nationwide in Korea for 17 service-related questions. Collected data were analyzed to identify the service elements demanded by patients and their satisfaction level under the circumstance in which their risk and information were uncertain owing to changing stages of the disease and their treatments. Findings: Patients' circumstances are categorized into diagnostic stage, low-risk treatment stage, high-risk treatment stage, and stabilized stage depending on the level of risk and the degree of uncertainty in the information during the treatment stage. There is no meaningful difference in the level of importance for the service factors, but meaningful difference exists in the level of satisfaction. The importance and satisfaction with service factors were ranked depending on the patient's situation. Service factors are derived for each area of management; areas of reinforcement, core improvement, maintenance and gradual improvement. Healthcare service model is suggested for each context and each management area of the cancer patients. Improvements/Application: It appears that there are few similar researches about service factors in accordance with changes in cancer patients' complex situations. In other areas, suggesting issues related to the services under complex situations through a model by each management area would be greatly helpful to the hospital management.

**Keywords:** Medical Service Factors, Service Quality Assessment, Situational Service Model

#### 1. Introduction

# 1.1 Background and Necessity of the Research

In comparison with other industries, the medical industry has paid relatively less attention on the importance of customer satisfaction. However, hospitals these days exert much effort to enhance customer satisfaction by providing a variety of service to patients and also developing various marketing strategies to improve their service quality.

It is essential that effective delivery of medical service and a high level of patient satisfaction should be followed by correct understanding of the service elements demanded by patients. Preferred service elements may vary depending on the type and severity of diseases, clinical status of patients, hospitalized or outpatients and guardians. Also, each service quality element has varying influence on customer satisfaction<sup>2</sup>. Each individual possesses different experience and the law of diminishing marginal utility tells us that demanding needs and expectations clearly depend on whether the service quality meets an individual's expectation<sup>3</sup>. Moreover, the zone

<sup>\*</sup>Author for correspondence

of tolerance between the upper limit and the lower limit might differ from individuals and circumstances<sup>4</sup>.

In particular, one of the characteristics of cancer patients would be that each patient has a different level of life risk. Also, the result of treatment at a preceding stage would determine the process of the next stage. In other words, the uncertainty of clinical information on treatments would lead cancer patients to demand different service elements at different stages of treatments, not to mention varying level of satisfaction at different stages. In<sup>5</sup> also claimed that the status of patients would determine their satisfaction with medical service: Cancer patients' satisfaction is closely related with the medical decisionmaking process and that their satisfaction also depend on the stages of the disease and their changing perception of the disease. In order to increase the cancer patients' satisfaction level, it is necessary to understand the required service content and the satisfaction level under the risky and uncertain information situations.

Many hospitals in Korea, however, tend to provide a uniform medical service without correct identification of the service elements actually demanded by patients and the relationship between service elements and patient satisfaction. Such a service system cannot enhance customer satisfaction and secure satisfactory cost effect or management performance<sup>6</sup>. An individual patient's expectation for service might also vary depending on his or her social and cultural background and thus, desirable service quality should take into consideration customers' convenience, risk and medical costs<sup>7</sup>.

Many researches have been already conduced on the cancer patients' satisfaction with medical service from the angle of service-providers. However, the service elements and patient satisfaction have not been investigated in connection with the severity of cancer or the different treatment stages of the disease. Thus, the current research aims to identify the relationship between the risk level of cancer patients and the uncertainty of clinical stage information on one hand and the needed service elements and patient satisfaction on the other. Thus, we intend to eventually present an effective medical service model based on different stages of cancer patients.

# 2. Research Purpose

The central purpose of the current research is to identify how varying clinical stages of cancer patients and varying uncertainty would affect their demanded medical service elements and their satisfaction with provided medical service. The eventual goal is to propose a service model adequate for each stage of the cancer patients.

# 3. Theoretical Background

#### 3.1 Quality of Medical Service

### 3.1.1 The Concept of Service Quality and **Measurement Elements**

Customers naturally compare their expectation for a service with the actually provided service to see how much their expectation is met. The service quality, in turn, is measured by a definite criterion of whether a service is well provided to meet customers' expectation.

In<sup>8</sup> defined service quality as the level and direction of discrepancy between expected service and perceived service in terms of service-providing process and its results. They stressed the importance of an expanded concept of core elements of marketing: 4 P's (product, price, place, promotion) + people, process and physical environment. In<sup>9</sup> also proposed that the range of service includes its contents, process, structure, results and influence that medical service, in particular, exerts an influence not only on patients but also on their family and community.

The most popular tool for measuring service quality would be SERVQUAL proposed by8. Or slightly modified versions of the model in which customers' expectation and perceived service are measured in terms of the factors of reliability, responsiveness, assurance, empathy, and tangibility<sup>10</sup>. Another model is Cronin and Taylor's SERVPERF, outcome-based measurement instead of outcome vs expectation. Other models are based on a variety of service quality components: among them are Gronroos's technical and functional quality elements and Haywood-Farmer's human, physical and process factors<sup>10</sup>.

# 3.1.2 Elements and Measurement Items for Medical Service Quality

Service provided medical organizations possesses a variety of features, and thus the factor, elements and measurement items for patient satisfaction might vary from different perspectives and different researchers.

A patient may not be aware of the content and process of the medical service until he or she receives treatment.

In order to overcome the uncertainty due to the asymmetry of information, patients may try to evaluate medical service quality on the basis of objective elements such as location, reputation of doctors, kindness, facilities and medical equipment. In other words, people tend to add tangible elements to intangible service elements to evaluate hospitals. Thus, hospitals now consider such a trend.

The current research aims to identify the service elements demanded by patients and their satisfaction with medical service. To that purpose, a set of factors were classified into human factors, physical facilities, and systems and processes on the basis of infrastructure criterion (hereinafter referred to 'INFRAS'). The measurement items for these factors were extracted from some previous studies including the models used by 'Ministry of Health and Welfare' and 'Korea Consumer Agency', Republic of Korea. A slightly revised version in consideration of university hospitals was adopted, as shown below in Table 1.

**Table 1.** Evaluation items of medical service quality

Service factors	Treatment- related items	Other medical items
Human Factors	<ul><li>· medical specialty</li><li>· communication</li><li>· explanation</li><li>· kindness</li></ul>	· reliability of hospital
Physical facilities	· medical equipment	· comfort facilities · amenities · parking · location
Systems & processes	· delay of admission or surgery · one-stop medical service · medical information	· simplicity of procedures · waiting time · leisure program · medical expenses

# 3.2 Risk of Patients and Uncertainty of **Information on Medical Treatments**

### 3.2.1 Disease and Treatment Stages of Cancer **Patients**

Each cancer patient would experience a varying degree of pain or hope in terms of life risk, since each goes through a different stage of the disease or treatment. Therefore, change in the disease stage would bring about change

in the patient's thoughts, attitude and way of living. As a consequence, their demand for medical service and the level of perception of service quality would change accordingly. The life risk might refer to the stage of the disease, which might depend on the size and depth of a tumor and its transition to another organ. The disease of cancer is classified into 4 different stages: the higher the stage is, the higher the risk is11.

The stage of medical treatment usually determines treatment methods and processes like diagnosis, operation, radiation therapy, chemotherapy, and tracking observation. The content of treatments usually depends on the type and stage of cancer, patients' status and the result of treatments at a preceding stage. Thus, a cancer patient may often be faced with uncertain information on future treatments and their results. The treatment stages may be classified into diagnostic, therapy and stabilized ones. The more stages a patient have in the future, the greater the uncertainty becomes. Once a patient gets into the stabilized stage, for example, the information uncertainty will decrease accordingly.

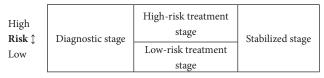
The level of risk and the uncertainty of treatment stage information would greatly affect patients' responses or their decision-making processes; their expectation for medical service and their evaluation of service quality would vary.

The present research adopted the classification of 12 depending on the level of risk and uncertainty of information: Diagnostic stage, low-risk treatment stage, high-risk treatment stage and stabilized stage, as shown below in Figure 1. A patient in the high-risk treatment stage naturally has higher risk than one in the low-risk stage. Accordingly, the level of information uncertainty would decrease as a patient goes through the diagnostic, treatment and stabilized stages.

# 4. Research Methodology

# 4.1 Research Design

The current research aims to propose an adequate medical service model based on service quality elements with the assumption that varying risk and information uncertainty, which result from different stages of the disease and treatments. It would cause patients to put more importance on one factor on the others. The research was conducted in the following steps.



High← Information Uncertainty → Low

\*Source<sup>12</sup>: "Analysis of Service Factors in Relation to Disease and Treatment Stages of Cancer Patients"

**Figure 1.** Risk and information uncertainty for cancer patients,

Setting status of cancer patients according to risk and uncertainty > Establishment of medical

service factors and measurement items  $\Rightarrow$  Investigation of the importance of service items and

their satisfaction →Analysis of correlation between importance of service elements and

satisfaction and Test of hypotheses  $\rightarrow$  Extraction of service models customized for patients.

#### 4.2 Hypotheses

A couple of hypotheses, as shown below, were tested on the INFRAS' service factors: Human, physical and system factors.

Hypothesis 1

The importance of each of the service factors (human, physical and system factors) perceived by patients would vary from different level of risk and information uncertainty.

Hypothesis 2

Perceived patient satisfaction with the service factors (human, physical and system factors) would vary from different level of risk and information uncertainty.

## 4.3 Research Subjects

The subjects of the research consisted of outpatients and their guardians at cancer clinic of university hospitals. Guardians were also included in the subject group, since the role of family members is very important in the process of treatments and they often participate in decision-making processes. They often represent patients. This group of patients was classified into the following four stages of the disease and treatments: 41 in Diagnostic stage, 83 in Low-risk stage, 114 in High-risk stage and 48 in Stabilized stage.

#### 4.4 Data Collection

The data under discussion were collected from a group of 286 outpatients and guardians in 7 university hospitals

located in 6 big cities in Korea. They were asked to fill out an self-administered questionnaire.

#### 4.5 Data Analysis

Collected data were analyzed to identify the service elements demanded by patients and their satisfaction level under the circumstance in which their risk and information were uncertain owing to changing stages of the disease and their treatments. The current analysis was conducted with the program of SPSS version 18.0. A set of analytical methods were performed: Frequency analysis and technical statistics on the subjects, reliability analysis of the collected data, correlation analysis between the importance of service elements and satisfaction, and between subfactors, MANOVA (Multiple Analysis of Variance), and IPA analysis to extract appropriate service models for various statuses of patients.

#### 5. Research Results

#### 5.1 Reliability and Validity

As mentioned above, service elements were classified into human factors, physical facilities, and systems and processes and Cronbach's  $\alpha$  values were obtained at 0.878, 0.788, 0.836, respectively, which all showed high internal consistency.

#### 5.2 Correlation Analysis

Pearson correlation analysis was conducted in order to identify the relationship between the importance of personal, physical and system factors and patient satisfaction. It was found that there was a significant correlation between importance and satisfaction, between the subfactors of importance, and among the subfactors of satisfaction.

# 5.3 Verification of the Hypotheses

Hypothesis 1

The importance of each of the service factors (human, physical and system factors) perceived by patients would vary from different level of risk and information uncertainty.

MANOVA analysis was conducted in order to identify the differences in the perceived importance of the service factors (human, physical and system factors) depending on different levels of risk and information uncertainty.

**Table 2.** Results of MANOVA analysis of importance of service elements depending on risk and information uncertainty

Factors	Group				F	p
	diagnostic(a)	low-risk treatment(b)	high-risk treatment(c)	stabilized(d)		
human	4.30±0.08	4.49±0.06	4.49±0.05	4.46±0.08	1.461	.226
physical	4.17±0.1	4.19±0.07	4.12±0.06	4.15±0.09	.243	.867
system	4.14±0.09	4.13±0.06	4.22±0.05	4.28±0.08	.814	.487

<sup>\*:</sup>p<0.05, \*\*:p<0.01 \*\*\*:p<0.001

**Table 3.** Results of MANOVA analysis of satisfaction of service elements depending on risk and information uncertainty

	Group					
Factors	diagnostic(a)	low-risk treatment(b)	high-risk treatment(c) stabilized(d)		F	p
human	3.72±0.11	3.84±0.08	3.79±0.06	4.14±0.1	3.554	.015* a <d< td=""></d<>
physical	3.64±0.11	3.71±0.07	3.59±0.06	3.80±0.1	1.214	.305
system	3.36±0.1	3.44±0.07	3.52±0.06	3.77±0.09	4.093	.007** a,b <d< td=""></d<>

<sup>\*:</sup>p<0.05, \*\*:p<0.01 \*\*\*:p<0.001

It was found that there was no significant difference, as illustrated below in Table 2 (Wilks lambda = .949, F (9, 682) = 1.660, p = 0.095).

Hypothesis 2

Perceived patient satisfaction with the service factors (human, physical and system factors) would vary from different level of risk and information uncertainty.

MANOVA analysis was conducted in order to identify the differences in the perceived satisfaction with the service factors (human, physical and system factors) depending on different levels of risk and information uncertainty. It was found that there was a significant difference, as illustrated below in Table 3(Wilks lambda = .920, F (9, 682) = 2.69, p = 0.005).

It was also found that the average score of the stabilized stage was higher than other stages, which perhaps indicates that lower uncertainty leads to higher satisfaction. A post analysis of the differences between groups showed that satisfaction with human factors was higher in the stabilized stage than the diagnostic one, and that satisfaction with system factors was higher in the stabilized stage than the diagnostic and low-risk treatment stage.

# 5.4 Rankings of Service Factors in Importance and Satisfaction

The current research has addressed the issue of whether the importance of service factors and satisfaction with them would vary depending on patients' different disease and treatment stages. Relatively low statistical significance was obtained for some service factors in a few cases, but we derived rankings of the factors in importance and satisfaction using the average score with the assumption that statistical significance might be different from practical statistical meaning. Table 4 illustrates the rankings of the service factors in importance and satisfaction, whereas Table 5 shows the rankings of the service factors at the four stages.

**Table 4.** Rankings of service factors in importance and satisfaction

Importance	Satisfaction
human> system > physical factors	human> physical > system factors

<sup>\*</sup> The level of satisfaction is statistically significant but importance is not.

Some of the important findings are as follows. Human factors were perceived as the most important than the others in all the stages of patients. Moreover, the patients reported that they were most satisfied with human factors than the others (See Table 4, 5). Physical facilities were found the least important. In particular, their importance was low in the high-risk treatment and stabilized stage, but the patients' satisfaction with physical factors was not really low (See Table 4, 5). As for systems and processes, they were the least important in the diagnostic and low-

risk treatment stages. It is worthwhile to note that all the groups of patients were the least satisfied with the system factors (See Table 4 and 5).

**Table 5.** Rankings of service factors at different patient stages

patient	rank of service factors		
stage	importance	satisfaction	
diagnostic	human factors > physical facilities >	human factors > physical facilities >	
low-risk treatment	systems & processes	system & processes	
high-risk treatment stabilized	human factors> system & processes > physical facilities		

<sup>\*</sup> The level of satisfaction is statistically significant but importance is not.

# 5.5 Medical Service Models for Cancer **Patients**

IPA (Importance-Performance Analysis) analysis of the importance and satisfaction with service elements was conducted to present a desirable medical service model which consists of four areas, as illustrated in Table 6. The four areas were extracted by taking the results of analysis of the importance and satisfaction with service elements at different treatment stages.

- Reinforcement area: Both importance and satisfaction were higher than the average. It is strategically necessary to reinforce those service elements at the current level or higher.
- Core improvement area: Importance was above the average but satisfaction was lower than the average. Those service elements should be improved immediately.
- Maintenance area: Importance was lower than the average but satisfaction was higher than the average. Passive efforts might be exerted to maintain the current level.
- Gradual improvement area: Both importance and satisfaction were lower than the average. It is strategically proper to assign a low priority to those service elements or passively deals with them.

The results of IPA can be summarized as follows. First, it was found that human factors were perceived high in both priorities and satisfaction in all groups regardless of the level of risk and information uncertainty. Thus, these factors were classified as belonging to reinforcement area (See Table 6). This might be in the same line with the view that human service such as knowledge ability, techniques, and experience of medical staff would play an important role in giving trust and satisfaction. Therefore, enhanced satisfaction with treatments can be gained by expertise in diagnosis and therapy, comfortable treatments, and trust<sup>13</sup>. The relationship between a doctor and a patient is also crucial to enhance satisfaction<sup>14,15</sup>. It is necessary to maintain effective management of a set of human elements: expertise, proper explanation, kindness, communication and image of hospitals.

It was found that physical factors were generally not considered important. Satisfaction was high in the diagnostic and low-risk phase with high uncertainty. Thus, this would belong to maintenance area. However, patients at the high-risk and stabilized phase were little satisfied, which should be gradually improved (See Table 6).

Considering that the priority of physical factors was high at the early stage of using hospitals such as the diagnosis phase (See Table 2), people tend to evaluate hospitals on the basis of tangible features at the initial stage of using hospitals. This perhaps indicates that it is easier to evaluate facilities or equipment and people tend to trust in these tangible features. This should be taken into consideration in service management for new patients.

System factors were not given high priorities. They were classified as belonging to gradual improvement area, since satisfaction with them were also low (See Table 6). It is necessary to gradually improve system of providing medical information, treatment process and waiting time management and medical expense system.

# 6. Concluding Remarks

Considering that the importance of service factors and satisfaction with them vary depending on patients' status, it is essential that each patient's condition be taken into consideration to enhance service quality and satisfaction instead of providing a uniform service.

It was also found that patients were more satisfied with those service elements with higher importance and less satisfied with those with less importance. That might be attributable to the assumption that they were less interested in those service elements on which they did not place stress. Also, it is very likely that hospitals

areas		diagnostic	low-risk	high-risk treatment	stabilized	
	importance	satisfaction		treatment		
Reinforcement	1	1	human factors	human factors	human factors	human factors
Core Improvement	1	1				
Maintenance	1	1	physical facilities	physical facilities		
Gradual Improvement	1	1	systems and processes	systems and processes	systems and processes physical facilities	systems and processes physical facilities

Table 6. Proposed medical service model for cancer patients

have already identified the service elements that patients consider important. It is necessary that hospitals keep identifying important service elements demanded by patients in order to enhance their satisfaction. In particular, the core improvement area needs to be improved as soon as possible and the reinforcement area should be effectively managed.

In general, higher satisfaction was closely related with low risk and uncertainty. It might mean that reducing information uncertainty by providing proper explanation or allowing patients to participate in decision-making processes would enhance satisfaction with service, reduce conflicts with patients, increase treatment effect, and eventually improve management performance of hospitals.

# 7. Acknowledgments

This study was supported by Research Foundation of Namseoul University.

#### 8. References

- 1. Peter GM, Linda E, Swayne W, Duncan J. Strategic management of health care organizations. 4th ed. Part 1 Chapter 3. Blackwell Publishing; 2002. p. 92-136.
- Lyngkhoi R, Brindha G. A Study on Patient Satisfaction of Outpatient Department. Indian Journal of Science and Technology. 2015; 8(32):1-5.
- 3. Clayton CM, Grossman JH, Hwang J. The innovator's prescription: A disruptive solution for health care. 2010; 4(1):164-201.
- 4. Parasuraman A, Leonard L, Berry B, Valarie A, Zeithaml Z. Understanding customer expectations of service. MIT Sloan Management Review. 1991; 32(3):39-48.

- Peter TC, Tellefsen C, Espindle D, Getter C, Hsu M. Psychometric validation of the cancer therapy satisfaction questionnaire. Value in Health. 2008; 11(4):669-79.
- 6. Kim S. Service business management. Chapter 5. Publishing Cheongam; 2007. p. 157-98.
- 7. Liu JJ, Bellamy GR, Cormick MM. Patient bypass behavior and critical access hospitals: Implications for patient retention. J. of Rural Health. 2007; 23(1):17-24.
- Parasuraman A. Superior customer service and marketing excellence: Two sides of the same success coin. Vikalpa: The Journal for Decision Makers. 2000; 25(3):3–12.
- James FA, Mona J. Fitzsimmons F. Service Management: Operations, strategy, information technology. 5th ed. Korea: McGraw-Hill; 2006. p. 147-52.
- 10. Nitin S, Deshmukh SG, Vrat PP. Service quality models: A review. International Journal of Quality and Reliability Management Emerald Group Publishing Limited. 2005; 22(9):913-49.
- 11. Stages of Cancer Progression. National Cancer Information Center. Available from: http://www.cancer.go.kr
- 12. YounInhee, Kim S. Analysis of service factors in relation to disease and treatment stages of cancer patients. Korean Journal of Hospital Management. 2012; 17(4):133-66.
- 13. Glenn BS, Audie A, Atienza A, Ruben E, Perczek P, Thomas M, DiLorenzo D, Abby C, King K. Intervention-related cognitive versus social mediators of exercise adherence in the elderly. American Journal of Preventive Medicine. 2002; 23(2):80-6.
- 14. Ben-Sira Z. The function of the professional's affective behavior in client satisfaction: A revised approach to social interaction theory. Journal of Health and Social Behavior. 1976; 17(1):3-11.
- 15. Terzic-Supic Z. Institute for strategic management of hospital, Hospital Management. Sinkwang Publisher; 2003. p. 371-4.