

Proposal of Quality Study for Nursing-Care Service

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ABSTRACT

Quantitative measurement of service process and service quality are necessary to evaluate the service productivity. We have measured employee behaviors at nursing-care facilities using the time and motion study, and visualized their nursing-care service processes. However, we have not assessed the service quality. Therefore, this paper describes development of a service quality model and a measurement system for it in nursing-care services. We examined a nursing-care facility and assessed employee consciousness related to service quality using interviews and questionnaire surveys to develop service quality model. We then proposed a quality study for methods of measuring service quality, along with prototype software developed for the quality study.

Keywords: Service engineering, Nursing-care service, Service process, Quality, Measurement

INTRODUCTION

Nursing-care services are provided in Japan as facility care services, home care services, and day services. The facility care services are provided at nursing homes where elderly people live. Home care services are provided at individual homes of elderly people. Day services are provided at nursing facilities that elderly people visit. At nursing care facilities, employees such as care workers, nurses, and care managers provide nursing-care services according to care plans designed to meet residents' physical and mental conditions and needs. In addition, they have heavy physical and mental workloads because of limited human resources. Hence, they must improve service productivity to fulfill residents' satisfaction and reduce the workload.

The service productivity is defined as the ratio of input resources to provide service and the additional value provided to the customer. It is expected to be increased by the improvement of operational efficiency and additional value or by creation of new business (Research Group on Innovation and Production of Service Industry, 2007). We considered that the additional value included factors to increase customer satisfaction such as quality, safety, and security of nursing-care service, and that the resources were employment and management cost. Improvement of service quality while maintaining costs is one means to improve the service productivity in nursing-care services.

However, traditional evaluation of service quality has not been based on engineering methods but on the inspiration of managers or employees involved in nursing-care services because service quality includes many subjective factors. The authors inferred that a measurement system of service quality would be useful to improve the service productivity. Therefore, this study was undertaken to develop a service quality measurement system. As described in

this paper, we propose a service quality model and a service quality measurement method.

PREVIOUS WORK

The authors previously defined service processes as a flow of humans, objects, information, tools, time, and money in the service field, and also defined nursing-care service processes. The nursing-care service process indicated when, where, who, what, and to whom the employees acted. We developed a task classification for nursing-care services and a description of nursing-care service processes using a state transition model to visualize the nursing-care service process and to support the improvement of service productivity. Figure 1 presents the task classification structure for nursing-care services. We measured employees' behaviors at nursing-care facilities using a time and motion study, and visualized their nursing-care service process. We confirmed that visualization was effective for quantitative feedback, and evaluated the nursing-care service process (Miwa et al., 2012) (Miwa et al., 2013). Additionally, we are continuing development of a communication enhancement system to support the improvement and design of a nursing-care service process (Watanabe et al., 2013).

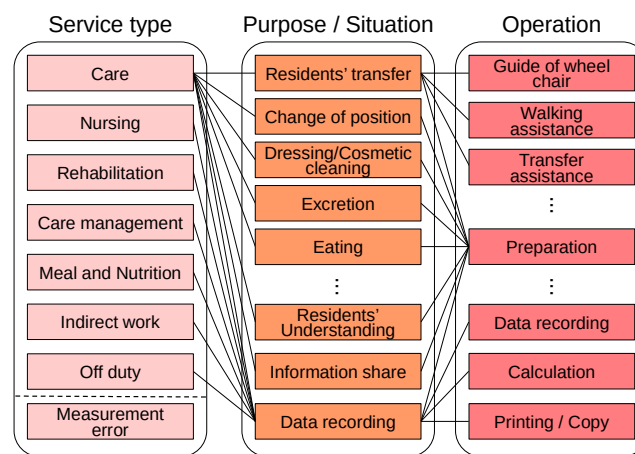


Figure 1. Three-layer structure of task classification for nursing-care service.

SERVICE QUALITY MODEL

Service Quality

In the field of manufacturing, productivity is defined as the ratio of production value and production cost calculated using the number of employees and their working hours. The production value would not vary if the amount of production remained constant. Accordingly, reduced working hours would be effective to increase productivity.

However, in the field of services, the concept of productivity is extended, and service productivity is defined as the ratio of additional value provided to a customer and input resources to provide services. Nursing-care services provide many services such as walking assistance, meal assistance, excretion assistance, health management, medicine management, and rehabilitation. The additional value of the nursing-care service is created by provision of appropriate service by service providers such as care workers and nurses to service receivers such as elderly people and facility residents. In addition, uniform services do not satisfy service receivers because their physical and mental condition are individualized. Optimization to their condition is necessary to increase their satisfaction. Therefore, we defined service quality as adequacy of service provided to the service receivers, and inferred that service quality is proportional to the additional value created in the service.

Moreover, the additional value varies according to the employees' skill and assistance procedures even if the provided service is the same in the nursing-care service. The service productivity does not increase when the additional value is decreased by reduction of the resources. In the worst case, service productivity decreases and becomes trapped in a negative loop because of emergent difficulties related low service quality.

Therefore, modeling and measurement of service quality and input resources are necessary to evaluate service productivity of nursing-care services. As described in the previous section, we measured nursing-care service processes with the time and motion study. This work contributed to the evaluation of input resources. However, we have not measured how employees provided their services and developed the service quality model.

Modeling of Service Quality

We examined a health institute on long-term care for the aged “Wakouen”, located in Nanao, Japan. We interviewed two care workers to survey differences of service quality among employees. They responded that large differences prevailed in terms of meal assistance and excretion assistance among employees. Especially, the meal assistance had the features shown below.

- * Meals are pleasurable for elderly people.
- * Employees have longer contact with elderly people during meal assistance than during other services.
- * Employees must check more points when providing meal assistance than during other services.
- * Employees have higher awareness of meal assistance more than of other services.
- * Elderly people face a risk of death or injury in case of aspiration.

Providing high-quality meal assistance service increases satisfaction of elderly people. Moreover, meal assistance constitutes an important nursing-care service. Therefore, we chose to develop a service quality model for meal assistance from among many service that employees performed.

Quality of Meal assistance

We interviewed a care worker, a nurse, and a managerial dietician, all of whom were key persons related to meal assistance. Based on their responses, we developed a meal assistance service quality model. Results for meal assistance showed 28 important points related to service quality from the care worker, 14 points related to the nurse, and 30 points related to the managerial dietician. We extracted 11 categories and 43 service quality factors composing meal assistance service quality, as shown in Table 1.

Subsequently, we surveyed employee attitudes using a questionnaire. Employees chose items practicing daily meal assistance from the service quality factor of meal assistance. 66 employees giving meal assistance to the facility residents answered the questionnaire as shown in Table 2. Figure 2 shows response rate of each service quality factor of meal assistance. We inverted the response rates of factors 7, 8, and 26 which were negative questions. The average quantity of responses for an employee was 32.4 (SD: 6.35), the average quantity of responses for a service quality factor was 49.7 (SD: 11.9). The average response rate was 75.3% (SD: 18.0%).

Consideration

We assessed the relation between the service duration and the average response rate. Then, the average response rate showed a linear increase with the service duration, as shown in Figure 3. Longer-term employees were able to practice more service quality factors in daily work. The correlation coefficient between service duration and the average response rate was 0.92. The regression model is shown as equation (1). Its coefficient of determination R^2 was 0.844.

$$y = 0.978x + 68.0 \quad (1)$$

x: service duration year
y: average response rate %

However, not all factors were proportional to service duration. Results showed that short-term employees got a high response rate of some service quality factors. We calculated the mean and standard deviation (SD) of the response rate. Service quality factors with high mean value had low SD. Those with low mean value had high SD, as shown in Figure 4. We classified them into two groups using discriminant analysis. Group 1, including 28 factors, had a high mean value and low SD. Group 2, including 15 factors, had a low mean value and high SD.

Table 1: Service quality factors of meal assistance

ID	Category	Service quality factor in meal assistance
1	Before meal	Do vocal exercises before meals.
2		Communicate with the resident before meals.
3		Devise ways of meal serving to increase the resident's motivation to take meals.
4		Check to confirm that a resident has finished to take medicines before meals.
5	Choke	Count resident's choking during meals and record the number.
6		Mind that the resident does not choke during meals.
7	Eating speed	Boost eating speed to finish the meal assistance on time when you are busy.
8		Hold the next food served on a spoon in front of the resident's mouth to maintain eating speed.
9		Reduce eating speed when residents are sick.
10	Posture	Check the wheel chair and bed angle before meals.
11		Adjust the wheel chair and bed angle according to resident's health condition.
12		Adjust the wheel chair and bed angle to avoid bending the resident's jaw backward during meals.
13	Meal condition	Check to confirm that morsel of food are suitable for the resident.
14		Check to confirm that meal conditions are suitable for the resident.
15		Check to confirm that meal conditions are suitable for the resident's health condition.
16	Assistance way	Do not continue meal assistance when residents cannot eat because of sickness.
17		Follow doctor or nurse instructions related to resident posture and morsel of food.
18		Change the eating order according to residents' preferences.
19		Do not look away, but hold eye contact with the resident during meal assistance.
20		Check the resident's facial expressions during meal assistance.
21		Do not mix pureed foods on a dish.
22		Give the next food portion after confirming that no residue remains in the resident's mouth.
23		Try an original mode of meal assistance according to residents.
24		Communicate with the resident to create a pleasant atmosphere during meal assistance.
25		Provide meal assistance service in the same way to the same resident, even if employees are not the same.
26		Try to give food to the greatest extent possible to get proper nutrition even if a resident feels bad.
27	Resident's condition	Evaluate the resident's health condition from their facial color, eyes, vital signs, stomach pains, and appetite.
28		Memorize the resident's likes and dislikes.
29		Check the resident's motivation for meals.
30		Provide a comfortable environment for meals.
31		Check the resident's fatigue during meal assistance.
32		Detect residents' attitudes about meals from their facial expressions and comments.
33		Try to give residents a good experience during meal assistance.
34	Information share	Hand-over what you notice when a resident's condition shows something unusual.
35		Give advice to other employees when you notice that their meal assistance practices are dangerous.
36		Provide meal assistance service after completely understanding all of the resident's information such as the doctor's instructions and handing-over.
37		Inform doctors or nurses when you notice that morsel of food, food condition, content of meals, or eating speed are unsuitable for a resident.
38		Confirm the resident's information at the nurse station when you forget the information.
39		Inform the resident's condition to nurses for their diagnosis when you notice that the resident's swallowing speed is slower than usual.
40		Inform the resident's condition to nurses for their diagnosis when you notice residents choke more than usual.
41		Confirm resident's information at the nurse station when you wonder about the mode of meal assistance.
42	Oral care	Do oral care after meals.
43	Family needs	Provide meal assistance service in a manner most consistent with family wishes.

Table 2: Survey conditions related service quality factors of meal assistance

Service duration	Job category							Sum
	Care worker	Nurse	Care manager	Physical therapist	Occupational therapist	Managerial dietician	Unknown	
< 1 year	4	1	2	1	0	0	0	8
1 - 3 years	12	2	0	0	2	1	1	18
3 - 5 years	4	2	0	2	0	0	0	8
5 - 7 years	7	1	0	0	1	0	0	9
7 - 10 years	4	3	0	0	0	1	0	8
10 - 15 years	3	2	0	0	1	0	0	6
15 - 20 years	2	1	0	0	0	0	0	3
20 years <	4	2	0	0	0	0	0	6
Sum	40	14	2	3	4	2	1	66

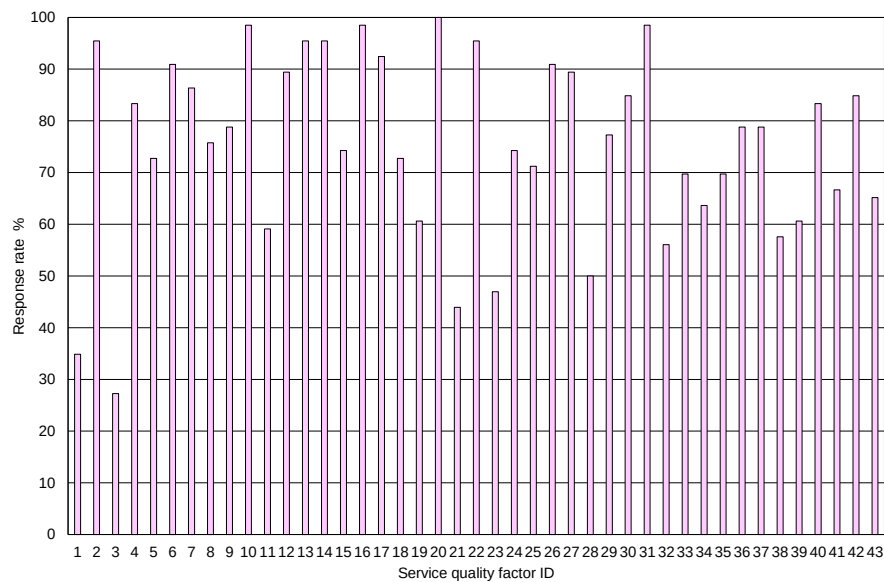


Figure 2. Survey results of response rate about service quality factors of meal assistance.

Figure 5 shows the relation between average response rates of each group and service duration. Group 2 increased the average response rate according to service duration more than Group 1. We assumed that all employees could practice the service quality factors in Group 1 irrespective of the service duration and that the factors should be provided to residents as usual services. We named it “Fundamental Quality (FQ)”. However, we considered that employees experientially acquired service quality factors in Group 2, and that the resident’s satisfaction was increased by providing the factors in Group 2. We named it “Experimental Quality (EQ)”.

As explained above, results showed that the service quality in meal assistance consisted of 43 service quality factors classified into two groups: FQ and EQ.

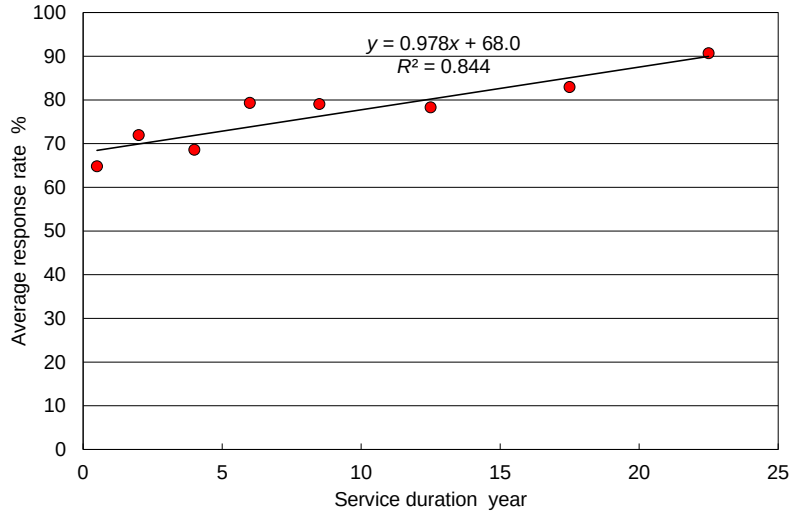


Figure 3. Relation between service duration and average response rate.

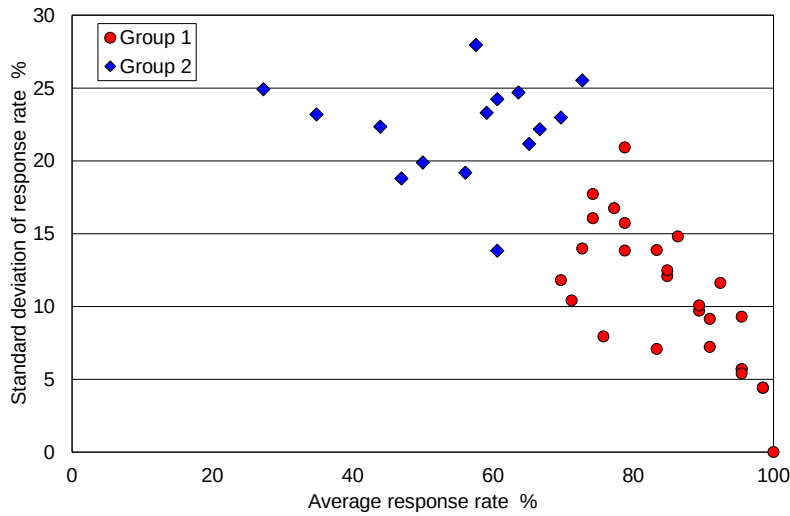


Figure 4. Average and standard deviation of response rate.

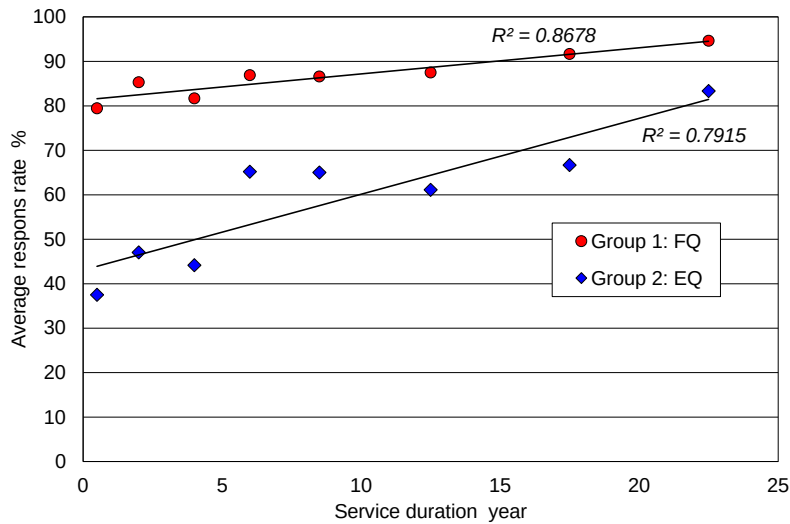


Figure 5. Average response rate of fundamental and experimental quality.

QUALITY STUDY

Proposal of Quality Study

To measure nursing-care service quality, we proposed a “quality study” by extension of the time and motion study used for our measurement of nursing-care service process.

The time and motion study is defined as “the observation and analysis of movements in a task with emphasis on the amount of time required to perform the task.” A continuous measurement method or work sampling method is generally used for the time and motion study. The subjects’ behaviors are assessed through observation by a third person or by self-reporting of the subjects (Pigage et al., 1954). Similarly, the quality study assessed the subjects’ service quality through observation by a third person or by self-reporting of the subjects.

In addition, service quality should be classified to standardize and compare the service quality similar to task classification for nursing-care services. We regarded service quality factors as applicable for the classification of service quality. For example, when we would like to measure the service quality of meal assistance, we can use the service quality factors of meal assistance proposed in the previous section. And, we observe and evaluate the employees’ FQ and EQ.

In the future, we expect to conduct continuous measurement for use in a quality study and for applications to employee training, as well as service process evaluation, by comparison of service quality among employees.

Development of proto type software

We considered not only that quality study but also time and motion study should be conducted and that overlapping visualization of their results was effective for deep evaluation of the service productivity. Nevertheless, it is difficult to record both quality study and time and motion study simultaneously in notebooks because employee behaviors in nursing-care service change quickly.

Therefore, we developed prototype software to support both quality study and time and motion study. Figure 6 presents a screen image. The prototype software runs on iOS (iPod touch, iPhone, and iPad, Apple Computer Inc., USA) and was released from the AppStore (Apple Computer Inc., USA). We were able to input free description as comments and service type, select service quality, location, and behavior from predefined lists. The “Start and Stop” button recorded the employee state and time. We were also able to measure two conditions or two employees in parallel using individual clocks implemented inside the software.

We will conduct the quality study and the time and motion study using the prototype software in the service field. Then, we will evaluate its efficiency and usability.

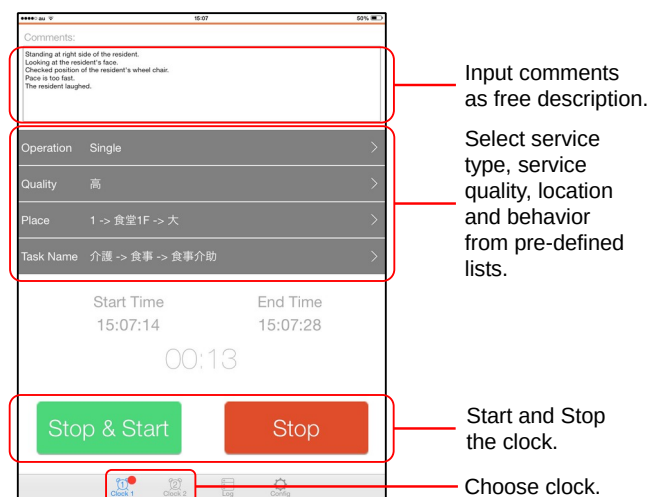


Figure 6. Prototype software to support quality study.

CONCLUSIONS

As described herein, we surveyed employees' attitudes related to service quality using interviews and questionnaires administered to employees at a health institute on long-term care for the aged: "Wakouen". We proposed a service quality model for meal assistance consisting of 43 service quality factors classified into two groups: Fundamental Quality (FQ) and Experimental Quality (EQ). FQ was acquired irrespective of the service duration; EQ was acquired from experiments. Additionally, we proposed the quality study as a method of measuring service quality, and proposed development of prototype software to conduct quality study and time and motion study simultaneously.

ACKNOWLEDGMENTS

This study was supported in part by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan, KAKENHI, Grant-in-Aid for Scientific Research (C), Grant Number 24500676. The authors also would like to express their appreciation to Keiju Healthcare System and to Wakouen.

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