Scale Development of Intelligent Home Care Service Quality

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Abstract

Aging has become a worldwide problem. Intelligent home care is the current stage of the more innovative ways of providing for the aged. Objective and impartial evaluation of the quality of care services for the elderly has an important significance to improve the pension system, this paper attempts to build a intelligent home care service quality model. On the basis of the SERVQUAL model, this paper, from the five dimensions of reliability, ease of use, visibility, responsiveness and empathy, the development of intelligent home care service quality scale. The exploratory factor analysis of the scale of the reliability and validity of internal consistency reliability analysis, test results show that the dimensions of the wisdom of home-based care services quality is reasonable, all items through the validity test.

Keywords: Intelligent Home Care; Service Quality; Scale Development

1. Introduction

The United States Census Bureau released the "aging world: 2015 report" that the global population continues to soar, and there will have 1.6 billion elderly people in the world by 2050 and more than 21% of the aging in 94 countries(Wan et al,2015). In accordance with international practice (Flaherty et al, 2007), China's aging level is much higher than the 10% standard, which indicates that China's aging is more serious. The World Health Organization has predicted that the proportion of China's aging will as high as 35% in 2050; China will become the country with the most aging population. The problem of aging in society has become a global problem, as an integral part of the elderly care service system; pension agencies play an increasingly important role. Among them, the care service's quality directly affects the lives of the elderly, how to objectively evaluate the care service's quality has been a hot topic of concern to academics and practitioners. This paper focused on the evaluation of the care service's quality, summarized the essays at home and abroad and finally developed and analyzed a intelligent home care service's quality of the scale, which is hoped to be helpful to the follow-up study.

2. Literature review

In the late 1970s, scholars gradually introduced the concept of quality to the service area, and began to study the quality of service. Lewis and Booms (1983) suggest that quality of service is used as a tool to assess the consistency between the service level in enterprise and the degree of customer's expectation about services. Gronroos (1982) pioneered the concept of a new quality of service --customer perceived service quality. Gronroos (1982) believes that service quality is mainly a subjective category, which is determined by the customer's subjective feelings. The quality of service depends on the customer's perceived service level and expected service level. If perceived service level is higher than the expected service value,it will be considered as a higher service quality. Parasuraman et al (1985) classify service quality into three categories, including entity quality, interaction quality and firm quality.

SERVQUAL model was proposed by Parasuraman, Valarie,and Zeitham--three marketers in the United States, which is the most widely used research methods in large number of service quality evaluation methods. When evaluating the enterprise's service quality by using SERVQUAL model, we can not only find out the gap in different enterprises according to the customer's evaluation of the overall service quality, but also find the

reasons of the gap through perceived service and expected service of each different dimension.

SERVQUAL model evaluates the service quality with five dimensions, which are reliability, tangibility, responsiveness, Ease of use and empathy. SERVQUAL model favored by many scholars(Shama et al,2016; Halvorsrud et al,2016; Hall et al,2015; Jaakkola et al,2015) , but some scholars questioned the model. Carman (1990) found that SERVQUAL model stability is well, but the SERVQUAL model should be different between different industries. Asubonteng, McCleary and Swan (1996) pointed out that the research on service quality should combine the qualitative and quantitative, while studying the quality of service structure should also explore the corresponding measurement methods and research to adjust SERVQUAL model in different industries.

3. The dimensions of the intelligent home care service's quality

We reviewed some essays and found that the dimension of service quality evaluation is mainly based on SERVQUAL quality evaluation, which includes five dimensions and 22 evaluation items. And this scale has been tested in the retail industry, hotels, online stores and other service industries, and shown good reliability and validity. However, the development of home care service industry in China is still in the exploratory period and lack of the relevant research. The intelligent home care service system as a global model of innovation, the development of the system is still need to improve, and it has not been widely used. How to evaluate the quality of intelligent home care services is still need to explore. we need to extract the dimensions of its composition to ensure the effectiveness of the intelligent home care service quality measurement scale.

In order to make the dimension of the service quality evaluation and item more applicable, we mainly use the method of depth interview to do a qualitative study with the users of the intelligent home care service system to ensure the validity of the concept and scale. We conducted a one-to-one and depth interview with 15 users. We've read the interview records repeatedly and compared the extracted key sentences with the five evaluation dimensions. We find the following three problems:

The first, in SERVQUAL evaluation dimension, reliability mainly refers to whether the service level can be maintained at a certain level, and reliability mainly refers to the service personnel's professional ability and confidence. However, the interviewers think there is no essential difference between reliability and reliability. For local consumers, they pay more attention to reliability and reliability mainly refers to whether the service makes consumers feel at ease. There are multiple factors will affect consumer's feeling, for example: whether service personnel are skilled in rehabilitation nursing and whether the food provided by system is reasonable. It's for users to ensure whether the system can achieve the intelligent function to protect the elderly health monitoring, anti-lost, a key help, etc.. Therefore, we combine the reliability and reliability into one dimension, named "reliability", to examine the intelligent home care services system's level of making the elderly feel at ease.

The second,from the result of interview, we found that the old have repeatedly mentioned on operational issues of the intelligent home care service system, such as "The help door bell is very convenient, when I'm uncomfortable ,I'll click on and someone will come to help me," "My daughter can view my health data online, she said it's easy to use ","The service staff said that there have health consultation at network platform, but I don't know how to use the internet and can't participate it. The interview results show that, unlike the traditional home care services, intelligent home care services combined with Internet technology, Internet of things technology, mobile Internet technology, eldearly acceptance of these new technologies and perception of use will directly affect the perceived quality of service. The technology acceptance model argues that the more easily the user perceives the information system or technology, the more positive attitude of the technology and the more useful things perceived of the information system or technology. So we will add the dimension, named "ease of use", to examine consumers' perception when using the intelligent home care services system.

The third, in addition to reliability 和 ease of use, the service quality dimension derived from the results of the consumer interviews is consistent with the SERVQUAL evaluation model， and also includes tangibility, responsiveness and empathy. Tangibility refers to the tangible elements provided for consumers by intelligent home care service system, such as service personnel's clothing, service tools, and service facilities and so on. Responsiveness refers to the extent of a intelligent home care service system can promptly process and respond to consumer demands. The main needs of the elderly, including home appliances repair, cleaning services, dredging services and other domestic services; food services, living services, bathing services, personal hygiene services and other life care services; health massage, discharge and other rehabilitation services, health advice, medical assistance and other simple medical services, these needs related to the basic necessities of life and

health and other aspects of the elderly, whether the service is in time will directly affect the old people's feeling on the quality of pension services. Empathy refers to the level of the intelligent home care services system to provide customized endowment services. In the interview, we found that the customized needs of the elderly mainly for the different types of rehabilitation services and focus on different points. There are three types of rehabilitation for the elderly: firstly, rehabilitation of spinal cord injury, rehabilitation of Parkinson's disease and rehabilitation of bone and joint diseases; secondly, rehabilitation of speech, swallowing function, cognitive function, cerebrovascular disease Rehabilitation and other cognitive impairment; Thirdly, high blood pressure, chronic obstructive pulmonary disease and other chronic disease rehabilitation. Different types of rehabilitation needs of the service personnel in accordance with the specific circumstances of the elderly and medical advice for the elderly, daily care in the specific circumstances need to be treated differently, such as nutrition is different. Therefore, whether the intelligent home care services system can provide customized services is crucial.

In summary, this study of the intelligent home care services' quality can be divided into five dimensions: reliability, ease of use, tangibility, responsiveness and empathy.

4. Scale development

4.1 Initial measurement item generation

By referring to the second chapter of the SERVQUAL scale, combined with the depth of consumer interviews, this study concluded that the wisdom of the 5 evaluation dimensions of home care service quality, a total of 24 items, as shown in table 1.

4.2 Modification of survey items

After determining the initial item, we need to make a progress assessment on the surface validity and content validity of these items, and give the corresponding revision.

First of all, we have invited 5 pension service staff, to determine the meaning and expression of the original title, to find out the difficult to understand. On the basis of the summary of views, we have made a preliminary revision of the expression of the item. Secondly, we will service the meaning and meaning of evaluation of the 5 wisdom in this study home-based care services quality dimensions to explain to the 5 staff, asking them to be 24 respectively in the 5 dimensions, and the items recorded not included in any one dimension or at the same time can be classified as more than two dimensions. Through classification screening, we found that the timeliness of dimension fifth items "to provide all-weather rescue service" is considered to have two aspects, not only can provide in order to ensure that the relief all day long rescue time, can also be understood to provide the safety and reliability of medical aid for intelligent home care system, so this is also a question in the two dimensions of timeliness and reliability, we are deleted. Finally, we invited 3 teachers in service marketing research direction, to make further screening of the 23 items retained. We will each item corresponding to the dimension and the specific meaning of the dimension for each teacher, please they should question whether or not to express the corresponding dimension of the degree of evaluation, that is, in general, can not fully explain that. If an item is a "cannot explain" evaluation, then delete it. When the item is received more than two "full instructions", the item can be kept. Under this standard, 23 items were all retained, the final pre research questionnaire, the physical nature of the 5 items, the reliability of 6 items, timeliness of 4 items, 5 items of empathy, ease of use of 4 items.

Table 1. Initial survey item

Dimension	code	Measurement item	Source
Tangibility （T）	T1 T2 T3 T4 T5	offers good food and beverage flavor Service personnel clothes clean and tidy Rescue workers advanced equipment Monitoring and monitoring equipment, advanced technology A complete leisure and entertainment facilities	SERVQUAL scale Qualitative interview
Reliability （RL）	RL1 RL2 RL3	Food and beverage nutrition with reasonable Rehabilitation service personnel proficient in rehabilitation nursing skills Service personnel have professional psychological	SERVQUAL scale Qualitative interview

	RL4	counseling skills	
	RL5	Be able to monitor your health indicators, effective early warning health risks	
	RL6	One key to help improve the efficiency of the rescue, the rescue success rate	
		Children can get your personal data at any time, so that both sides feel at ease	
Responsiveness（RP）	RP1	for the appointment time services (for example, to provide clean room)	SERVQUAL scale Qualitative interview
	RP2	Service personnel can be the first time to respond to your request	
	RP3	For problems that can not be dealt with immediately, the service personnel can give the exact service time	
	RP4	When the service process errors, the service personnel can promptly remedy	
	RP5	To provide you with all weather service	
Empathy（E）	E1	will be in accordance with your physical condition and travel requirements customized travel plans	SERVQUAL scale Qualitative interview
	E2	In accordance with the pricing of taste, physical condition, economic situation with you	
	E3	According to your health status and needs, to develop rehabilitation programs to provide nursing services	
	E4	Will be in accordance with the characteristics of your personal needs to provide a specific service program	
Ease of use（EU）	EU1	intelligent pension system and the use of equipment and easy to learn	Qualitative interview
	EU2	The use of the service platform is easy to master	
	EU3	Operation of these devices will not make people feel a waste of time	
	EU4	Family members are able to skillfully use the intelligent pension system and equipment	

4.3 Survey questionnaire design

The design of the questionnaire we used the Likert 7 scale, asked respondents to describe for each item is to disagree, and can't agree, in general, have agreed to agree, and very much agree with the marker 1-7, which we added to the survey in the elderly income, marital status, living conditions, the disease status, the pre survey questionnaire.

Table 2. Survey questionnaire design

Code	Measurement item	Very do not agree to	Disagree with a point	Not agree with	General	Agreed to a little	Agreed	Agree very much
T1	Offers good food and beverage flavor	1	2	3	4	5	6	7
T2	Service personnel clothes clean and tidy	1	2	3	4	5	6	7
T3	Rescue workers	1	2	3	4	5	6	7

	advanced equipment							
T4	Monitoring and monitoring equipment, advanced technology	1	2	3	4	5	6	7
T5	Have perfect leisure and entertainment facilities	1	2	3	4	5	6	7
RL1	provides reasonable food and beverage nutrition	1	2	3	4	5	6	7
RL2	Rehabilitation service personnel proficient in rehabilitation nursing skills	1	2	3	4	5	6	7
RL3	Service personnel have professional psychological counseling skills	1	2	3	4	5	6	7
RL4	Be able to monitor your health indicators, effective early warning health risks	1	2	3	4	5	6	7
RL5	One key to help improve the efficiency of the rescue, the rescue success rate	1	2	3	4	5	6	7
RL6	Children can get your personal data at any time, so that both sides feel at ease	1	2	3	4	5	6	7
RP1	for the appointment time services	1	2	3	4	5	6	7
RP2	Service personnel can be the first time to respond to your request	1	2	3	4	5	6	7
RP3	For problems that can not be dealt with immediately, the service personnel can give the exact service time	1	2	3	4	5	6	7
RP4	When the service process errors, the service personnel can promptly remedy	1	2	3	4	5	6	7
E1	Will be in accordance with your physical condition and travel requirements	1	2	3	4	5	6	7

E2	Customized travel plans In accordance with the pricing of taste, physical condition, economic situation with you	1	2	3	4	5	6	7
E3	According to your health status and needs, to develop rehabilitation programs to provide nursing services	1	2	3	4	5	6	7
E4	Will provide a specific service plan according to your personal needs	1	2	3	4	5	6	7
EU1	intelligent pension system and the use of equipment and easy to learn	1	2	3	4	5	6	7
EU2	The use of the service platform is easy to master	1	2	3	4	5	6	7
EU3	Operation of these devices will not make people feel a waste of time	1	2	3	4	5	6	7
EU4	Family members are able to skillfully use the smart pension system and equipment	1	2	3	4	5	6	7

5. Prediction and analysis of scale

5.1 Internal consistency reliability analysis

We use Churchill (1979) method to purify the original item. We calculate the individual overall correlation coefficient (CITC) of each item, and delete the item with CITC value less than 0.5. Then, we calculate the topic item before and after purification of Cronbach alpha coefficient, if an item after delete scale Cronbach alpha coefficient is increased, you need to delete the items. Finally, we used exploratory factor analysis to investigate whether the factor load of all items was consistent with the dimension of the study, and the factor load was lower than 0.5 and the item of cross load was deleted.

We used SPSS16.0 to calculate the Cronbach alpha coefficient and the CITC coefficients of each item of wisdom home care service quality in all dimensions, as shown in table 3. The table shows that smart home Cronbach coefficient of pension service quality dimensions of the scale are far higher than 0.7, the overall correlation coefficient of each item is greater than 0.5, each item deleted after the Cronbach alpha coefficient than the original value is low, the results show that the pre survey scale items all through the reliability test that should be all the reservations.

Table 3. CITC and reliability analysis of each dimension measurement

Dimension	Item	CITC	Alpha if Item Deleted	Cronbach α
T	T1	0.788	0.901	
	T2	0.777	0.903	
	T3	0.851	0.888	0.919
	T4	0.743	0.910	
	T5	0.794	0.900	
RL	RL1	0.761	0.911	
	RL2	0.764	0.910	
	RL3	0.705	0.918	0.923
	RL4	0.835	0.901	
	RL5	0.821	0.902	
	RL6	0.786	0.908	
RP	RP1	0.709	0.806	
	RP2	0.592	0.855	0.852
	RP3	0.733	0.800	
	RP4	0.777	0.775	
E	E1	0.671	0.774	
	E2	0.629	0.787	0.824
	E3	0.586	0.799	
	E4	0.640	0.785	
EU	EU1	0.716	0.869	
	EU2	0.854	0.818	0.887
	EU3	0.697	0.886	
	EU4	0.777	0.849	

5.2 Exploratory factor analysis

Next, we used exploratory factor analysis to test the validity of the pre survey questionnaire. First in the s' Bartlett spherical test (p<0.000), the calculated KMO value is 0.876, which indicates that the research data is suitable for factor analysis. Then we use varymax (Varimax) has 5 eigenvalue greater than 1 factor, in Table 4 we list the load coefficient is greater than 0.5 of the data, we use principal component analysis method with varimax (Varimax) to obtain eigenvalues greater than 1 factor, as shown in Table 4 we list only is greater than the load factor of 0.5, a total of 5 factors, the cumulative variance accounted for 73.49%. The results are shown in Table 4, all items of the load factor is consistent with the hypothesis that the dimension of this paper, we divide the dimensions of home-based care services quality of wisdom is reasonable, all items through the validity test, do not need to continue cleaning on the initial items, can make formal data research.

Table 4. Exploratory factor analysis results

Dimension	Item	Factor				
		1	2	3	4	5
T	T1		0.827			
	T2		0.861			
	T3		0.853			
	T4		0.672			
	T5		0.748			
RL	RL1	0.796				
	RL2	0.767				
	RL3	0.716				
	RL4	0.836				
	RL5	0.873				
	RL6	0.824				
RP	RP1				0.810	
	RP2				0.576	
	RP3				0.855	
	RP4				0.778	
E	E1			0.753		
	E2			0.813		
	E3			0.706		
	E4			0.767		
EU	EU1					0.677
	EU2					0.765
	EU3					0.592
	EU4					0.692

6. Conclusion

Intelligent home care service quality evaluation has been an important research problem in the academic community. Based on the SERVQUAL model, the development of the wisdom of the quality of home care service from the reliability, ease of use, visibility, responsiveness and empathy. This paper adopts and exploratory factor analysis of the scale of the reliability and validity of internal consistency reliability analysis, test results show that the dimensions of the wisdom of home-based care services quality is reasonable, all items through the validity test. There are many potential directions for future research. First of all, scholars would analyze the status quo of China's intelligent home care service quality. Secondly, scholars would summarize the existing problems in the intelligent home care service. Finally, scholars would find the influencing factors of the intelligent home care service quality.

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