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Abstract: The aim of this study was to evaluate service quality that is provided in hospitals affiliated to Mashhad University of Medical Sciences based on SERVUSE model in 2018. In this cross-sectional study, 130 cardiac surgery patients of three hospitals were being investigated using SERVUSE questionnaire. The questionnaire had six dimensions: tangibles, reliability, responsiveness, assurance, empathy and usability. The validity was approved through the content validity and its reliability by using Cronbach's alpha. Data have been analysed by SPSS software. The gap between patient perceptions and expectations were as follows: tangibility (−0.52), usability (−0.23), reliability (−0.22), assurance (−0.21), responsiveness (−0.11) and empathy (0.06) and a significant relationship between expectations and perceptions and variables such as behavioural intention, perceived quality and satisfaction (p-value: 0.001). Managers should pay more attention to improve the physical environment of hospitals, utilise proper equipment in order to reduce quality gaps.

Keywords: quality of service; SERVUSE; patient preference; hospital; Iran.

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1 Introduction

Considering the importance of health in human life, healthcare services must be provided with quality. Perceived healthcare service quality plays an important role in determining the level of patient satisfaction (Pekkaya et al., 2019). Evaluating the level of satisfaction of people who benefit from healthcare services is of great importance (Pekkaya et al., 2019). Providing sufficient information on customers' perception of service quality can help organisations identify dimensions that affect their competitive advantage (Hekmatpour et al., 2012). In the healthcare sector, the quality of service that is perceived by patients is important because patients compare and judge healthcare providers (Deshval et al., 2014). If managers know and consider these weaknesses in the decision-making process, healthcare organisations can find an opportunity to provide higher quality service (Pekkaya et al., 2019).

Service organisations have been developing projects to ameliorate the quality of services. However, quality of service remains the biggest problem facing these organisations (Esteki and Attarfar, 2012). In many studies (Papanikolaou and Zygiaris, 2014; Money et al., 2015; Suki et al., 2011; Al-Borie and Damanhour, 2013; Fan et al., 2017; Wath and Agarwal, 2017), managing service quality has always been one of the most important areas of concern in hospitals. With the advancement of lifestyle, education and awareness among consumers, they are becoming more and more demanding. This is the reason why hospitals are spending huge amount in managing service quality that leads to satisfaction among patients (Swain and Kar, 2017).

Hospital service quality is the difference between the patient's perception of the service and their expectations from the hospital providing such service (Upadhyai et al., 2019). On the other hand, the quality of medical services provided by public hospitals has become a basic principle in health (Radu et al., 2022).

SERVUSE is a tool for measuring quality; it is obtained from the modified SERVQUAL model. It assesses quality in six dimensions, including tangibles (appearance, facilities, equipment, and personnel and communication tool), reliability (ability to perform the promised service reliably and accurately), responsiveness (willingness to help customers and provide prompt service), assurance (the knowledge and courtesy of employees and their ability to convey trust and confidence), empathy (caring and the organisation's individualised attention for each customer), and usability (simplicity of use of a product for clients) (Strawderman, 2005). What distinguishes this model from the SERVQUAL model is the usability variable, which is defined as the simplicity of use of a product or service by three key factors: effectiveness, efficiency, and satisfaction (Haron et al., 2012).

In this study we determined the quality of hospital services in the tangible, reliability, responsiveness, assurance, empathy and usability dimensions. Measuring the quality of care from the patient's point of view is accepted in medical healthcare. It also aims to reveal which of these dimensions are relatively more important and effective for patient satisfaction. The analysis of service quality enables the hospital management to allocate financial resources to improve performance in areas that have a greater impact on the customer's perception of service quality. However, based on studies conducted on evaluating service quality, no experiment has been done in Iran using the SERVUSE model. Since patients are one of the most important groups in assessing service quality, the current study aims to examine the views of them. We aim to evaluate service quality based on the SERVUSE model at hospitals affiliated to the Mashhad University of Medical Sciences (MUMS).

2 Literature review

Many studies have been done on the quality of hospital services based on the SERVQUAL model (AlOmari, 2021; Anabila et al., 2019; Došen et al., 2020; Sharifi et al., 2021). But we propose this particular method (SERVUSE model), because this model has introduced a sixth dimension with its title: USABILITY. Within healthcare, it is critical that human factors constructs, such as usability, be evaluated. Healthcare

consists of a large human component within the system. This is true of both the provider and the consumer. Therefore, the system must be usable in order to be effective. In fact, in the USABILITY dimension we ask patients about ease of access, training medical and administrative processes to patients, ease in finding the needed information and understandability of information. Improving the quality of services is one of the most important goals of any hospital. SERVUSE, examines the overlap between these two constructs as a predictor of service quality. In a study titled 'Human factors and usability in service quality measurement' (Strawderman and Koubek, 2008), two SERVQUAL and SERVUSE tools were compared to better assess the service quality. This study showed that a more powerful tool can be developed by adding the variable 'usability' to the SERVQUAL model, a more powerful tool for measuring the quality and excellence of the services provided. Yet, except a study by Strawderman and Koubek, no other research has used the SERVUSE model, though some studies have investigated USABILITY as a variable of service quality (Haron et al., 2012, 2013; Haron and Hamid, 2011; Jensø and Haugen, 2005; Svagård et al., 2014).

3 Methods

3.1 Study design and sample

The aim of this cross-sectional study was evaluating the quality of services that is provided in the heart surgery ward in the hospitals and determining the quality of hospital services in the tangible, reliability, responsiveness, assurance, empathy and usability dimensions. In addition, determine the perceived quality, satisfaction and behavioural intention in the heart surgery department in view of patients. A pilot study with 80 questionnaires was conducted to determine the sample size due to lack of similar study, and given the statistical consultant. Using the information in the database of three hospitals, some patients from each of the hospitals were selected through proportional allocation and the 80 questionnaires distributed according to statistics of cardiac surgical patients in these hospitals. We put the results of a pilot study on the application PASS. Sample size with the power of 90% was calculated for 145 patients. So, 145 questionnaires were completed in first stage. However, due to the limitations of the study, such as mortality or cancellation of surgery and early discharge, 15 people were excluded. Finally, 130 questionnaires completed the second stage. A total of 130 patients who were admitted in 2018 to the heart surgery ward of Imam Reza, Ghaem, and Shariati hospitals affiliated to the MUMS were investigated. Using medical records and the proportional allocation method, 62 patients in Imam Reza, 51 patients in Ghaem, and 17 patients in Shariati were selected by the convenience sampling method.

3.2 Instrument

The data collection tool for measuring the quality of health services was the SERVUSE tool. The questionnaire was designed by Lisley Strawderman at the University of Pennsylvania. Since this tool was being used for the first time in Iran, researchers localised it first before using it. The results of localisation of this questionnaire were published in an article titled 'Validity and reliability of the Persian version of quality

assessment questionnaire (SERVUSE model)' (Houshmand et al., 2015). The questionnaire included 51 questions in five parts. Demographic characteristics (six questions); patients' expectations (18 questions); weighting (six questions); patients' perception (18 items); and the last part measured the overall quality, satisfaction, and behavioural intentions (three questions). The items were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In all the questions, numbers 1, 2, and 3 represented inappropriate, number 4 average, and numbers 5, 6 and 7 appropriate.

3.3 Data collection

The inclusion criteria for patients were: being hospitalised in the heart surgery ward, waiting for surgery, and being in the age range of 18 to 70 years selection criteria in our study were: candidates should have had an average of seven days of stay and should have elected to participate in the study: due to the two-step process of completing the questionnaire, ease of access to patients was important as well. The exclusion criteria included eliminating those who could not complete the second phase of the questionnaire because they were either dead or could not speak Persian. So, it was distributed among 130 patients to be answered. First, the demographic questions were asked (demographic information, admission time and reasonability of this amount of waiting time for patients). The data were collected in two phases and the patients completed the questionnaires twice at two different times. Thus, first time, before the reception, they were asked about the desired service quality and then, the second time, before discharge, they were questioned received service quality. In another studies patients completed the expectation questionnaires before admission and perception questionnaires after discharge (Sirohi and Singh, 2016; Oren et al., 2016; Jenaabadi et al., 2011; Qolipour et al., 2018).

3.4 Data analysis

Descriptive statistics – including frequency, percentage, average, and standard deviation – were used in the analysis. Also, Wilcoxon test, Mann-Whitney, Spearman correlation, and multiple regression were used since the distribution of data collected from the non-parametric test was abnormal. Data were analysed by SPSS18 to the significant level of 0.05.

4 Results

4.1 Descriptive analysis of the sample

Results showed that 57.7% of the patients were male, 63% of them resided outside the city of Mashhad, and 85% of them had a high school diploma or under diploma. Their mean age was 52.82 ± 11.86 . Statistics showed that 85% of the patients were first-time admissions to the hospitals concerned. The average waiting time for admission was 83 minutes, though 60% patients reported waiting time for admission as less than 60 minutes. Approximately 70% of the patients reported that the waiting time for admission was reasonable.

Table 1 Mean, standard deviation and the gap between expectations and perceptions on various aspects of the model

Different dimensions	Imam Reza Hospital						Ghaem Hospital						Shariati Hospital					
	Expectation			Perception			Expectation			Perception			Expectation			Perception		
	Mean	S.D		Mean	S.D	Gap	Mean	S.D		Mean	S.D	Gap	Mean	S.D		Mean	S.D	Gap
Tangibles	6.77	0.57		6.47	0.67	-0.30	6.77	0.64		6.25	0.98	-0.52	6.92	0.23		5.62	0.89	-1.30
Reliability	6.98	0.12		6.67	0.62	-0.31	6.88	0.38		6.74	0.65	-0.14	7	00		6.82	0.35	-0.18
Responsiveness	6.84	0.5		6.63	0.65	-0.21	6.75	0.62		6.81	0.46	0.06	7	00		6.78	0.37	-0.22
Assurance	6.98	0.12		6.76	0.56	-0.22	6.97	0.14		6.74	0.62	-0.23	7	00		6.88	0.28	-0.12
Empathy	6.69	0.53		6.74	0.4	0.05	6.67	0.76		6.75	0.46	0.08	7	00		6.98	0.08	-0.02
Usability	6.87	0.35		6.68	0.59	-0.19	6.91	0.23		6.71	0.6	-0.20	7	00		6.54	0.7	-0.46
Total	6.85	0.26		6.66	0.45	-0.19	6.83	0.3		6.66	0.52	-0.17	6.98	0.05		6.59	0.34	-0.39

4.2 Gap analysis

Table 1 shows the mean, standard deviation, and the gap between expectations and perceptions in different dimensions and hospitals. According to Table 1, the greatest gap in the Shariati Hospital was related to the tangible dimension with a score of -1.30 and the smallest gap was seen as related to the scope of empathy, with a score of -0.02 . In Ghaem Hospital, the greatest gap was found in the scope of tangibles, with a score of -0.52 , and the smallest scores were related to responsiveness and empathy, $+0.06$ and $+0.08$ respectively. So, in the Imam Reza Hospital, the greatest and the smallest gaps were seen in the scopes of reliability (-0.31) and empathy ($+0.05$) respectively.

4.3 Impact of socio-demographic factors on gap

Table 2 shows information about perceived quality, satisfaction, and behavioural intention for each hospital. According to Table 2, satisfaction in Imam Reza, with an average score of 6.24, and Ghaem, with an average score of 6.19, and behavioural intention in Shariati, with an average score of 5.94, obtained the greatest scores. According to Table 3, there is a relatively strong negative correlation between the time of admission and the reasonableness of the admission time (p value: 0.001, CC: -0.6) and between perceived quality and satisfaction (p value: 0.001, CC: -0.6); satisfaction and behavioural intention (p-value: 0.001, CC: -0.6) and the perceived quality and behavioural intention (p-value: 0.001, CC: -0.6) had a strong positive correlation. Using multiple regression method revealed that, on an average, we expect that the gap between perceptions and expectations for men is 0.184 units lesser than for women. Also, the admission time variable is not considered a significant variable.

Table 2 Mean and standard deviation of areas of perceived quality, satisfaction, behavioural intention

Dependent variable	Imam Reza Hospital		Ghaem Hospital		Shariati Hospital	
	Mean	S.D	Mean	S.D	Mean	S.D
Perceived quality	6.16	1.1	6.07	1.2	5.35	0.99
Satisfaction	6.24	1.2	6.19	1.44	5.76	1.14
Behavioural intention	6.19	1.4	5.8	1.97	5.94	1.39

5 Discussion

The results of the current study indicate that the gap score between expectations and perceptions in the tangible dimension is equal to -0.52 . This means that the studied hospitals have failed to respond to the expectations of patients with regard to the components of tangible quality of services: the hospital setting, appearance of staff, and medical equipment were not commensurate with the expectations of patients. Similarly, other studies (Hekmatpour et al., 2012; Tabibi et al., 2012; Nabilou, 2014; Purcărea et al., 2013; Khamis and Njau, 2014) have also confirmed this. But, in a study by Mehdizadeh et al. (2015), the lowest gap (-0.58) was related to the tangible factors, this contradicts our study results. In this context, allocating substantial funding to organise the appearance and tangible aspects of the hospitals to reduce this gap seems necessary.

Another study by Mendes et al. (2018) shows that tangibles had the least importance while reliability was the most important.

The gap in the reliability dimension was -0.22 , which means that there is a negative gap in the reliability of service quality and services provided were not as expected. The aforementioned result is consistent with other studies in this field (Tabibi et al., 2012; Ayoubian et al., 2015; Mohammadi et al., 2003; Aghamolaei et al., 2014; Rocha et al., 2017). For reducing this gap, staff should solve the patients' problem and make it possible for them to have access to all medical and nursing services at all times of the day, or to serve them at the most appropriate time.

The measured gap in the responsiveness dimension was -0.11 . As shown, responsiveness in Imam Reza and Shariati had a negative gap. However, the Ghaem gap score was positive, which means that from the patients' point of view the services provided in this dimension were more than what they expected: the hospital's staff performed well in providing fast service as well as displayed willingness to help patients. Hekmatpour et al.'s (2012) study indicate similar results with Ghaem Hospital. In contrast, the mentioned gap has been reported negative in some studies (Jenaabadi et al., 2011; Aghamolaei et al., 2014; Sina et al., 2015), this is consistent with our results in Imam Reza and Shariati hospitals. Also, in another study, 'responsiveness' had the lowest gap (Mohebifar et al., 2016). Therefore, necessary training is needed to improve the responsiveness of organisational culture which leads to the enhancement of performance quality. Furthermore, this can be solved by raising the level of nurses' communication skills.

The findings show that the gap is -0.21 in the assurance dimension. A negative gap indicates that patients' expectations have not been met about respect and confidence. These results are consistent with other studies (Bahadori et al., 2014; Rahim-Khanli et al., 2014; Pansiri and Mmereki, 2010). But this dimension was negative in the results obtained by Shafiq et al. (2017) In this regard, the staff members should pay more attention towards creating a sense of trust, respect, and security in interacting with patients.

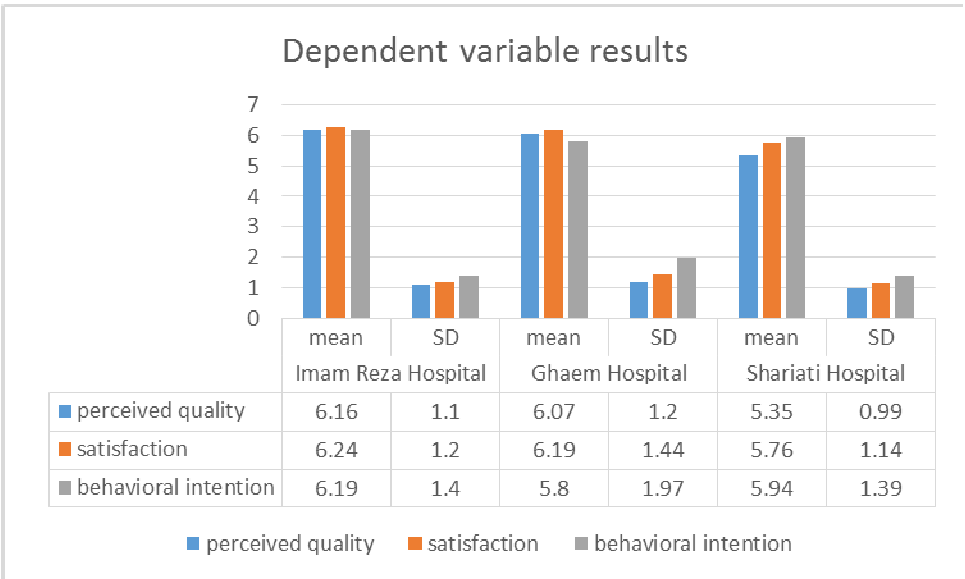
The total gap score for in empathy dimension was 0.06 . In Ghaem and Imam Reza, the empathy components in the form of individual attention and care were more than their expectations. In contrast, in Shariati, the gap was negative. Similar studies on empathy show that this gap has been negative (Papanikolaou and Zygiaris, 2014; Jenaabadi et al., 2011; Nabilou, 2014; Zarei et al., 2012; Al-Momani, 2016), these results are similar to the results of Shariati Hospital. Again, this gap has been positive in some studies (Ajam et al., 2014; Aman and Abbas, 2016; Mukhopadhyay, 2016), this is consistent with our results from Imam Reza and Ghaem hospitals. Reducing the gap in this dimension requires personal attention and heartfelt empathy towards patients and making decisions based on their interests. For example, hospital services should be provided at all hours, especially at admission time.

Sixth dimension, named usability, are as follows: the calculated gap score was -0.23 . The results showed that all three hospitals failed to meet the expectations of patients. In Strawderman and Koubek's (2006) study, which in fact was the only similar study with regard to applying the SERVUSE model, the gap in the usability dimension was -0.28 : this is consistent with the current study. In a number of studies (Hekmatpour et al., 2012; Fan et al., 2017; Ayoubian et al., 2015; Mohammadi et al., 2003; Fatima et al., 2017), instead of adding the variable usability to the SERVQUAL model, another dimension

such as ‘accessibility’ or ‘economic’ or ‘communication’ have been used: the amount of the gap for these variable is usually negative, which is consistent with the results of this study. Therefore, it is necessary to facilitate patients’ access to the wards and clinical units. On the other hand, service providers should present explanations to patients about the disease and course of treatment in a simple language because patients need this information to overcome their fear, worry, and stress.

Overall average score of ‘perceived quality’ in all three hospitals indicates that the overall quality of services provided to the patients is high. The results of Strawderman and Koubek’s (2006) study are somehow similar to the results of the current study: however, the average obtained in our study on perceived quality was higher. According to Cronin’s study in the USA, the overall perceived quality score indicates relative satisfaction among patients from the services received. The average score for ‘satisfaction’ in all three studied hospitals show that patients’ satisfaction from the service quality is relatively high. The results of a study conducted by Strawderman and Koubek (2006) are somewhat similar. Average score of ‘behavioural intention’ for the three hospitals revealed that the patients were often willing to return to the hospital they had been hospitalised (Figure 1).

Figure 1 Dependent variables results in this study (see online version for colours)



The results of studies by Strawderman and Koubek (2006) and Cronin et al. (2000), conducted in the USA, are similar. In order to improve service quality based on customers’ expectations, hospital managers must increase knowledge and skills of their employees in response to the needs of clients. In this regard, clients’ first experience is very important. In other words, measuring patients’ behavioural intention is a significant issue in the evaluation of service quality. Previous experiences of patients’ expectations with reference to patient satisfaction at discharge from hospital and creating an intellectual background and desirable experience which increases his or her willingness

to return to the same hospital can convert them to free advertisers. According to the results of another study, usability does not have any impact on perceived overall quality, customer satisfaction, and return intention for all hospital types (Calisir et al., 2014). This result is inconsistent with our results. It is well known that different contexts can lead to various results.

Table 3 The relationship between the variables studied

<i>Variables</i>		<i>Test</i>	<i>Result</i>
Admission time	Reasonableness of the admission time	Spearman correlation	P-value: 0.001 Correlation coefficient: -0.6
Perceived quality	Satisfaction		P-value: 0.001 Correlation coefficient: 0.81
Perceived quality	Behavioural intention		P-value: 0.001 Correlation coefficient: 0.7
Satisfaction	Behavioural intention		P-value: 0.001 Correlation coefficient: 0.77
Expectation	Perception	Wilcoxon test	P-value: 0.001
Gender	Satisfaction	Mann-Whitney	P-value: 0.03
	Expectation		P-value: 0.001
Gap between expectation and perception	Gender	Multiple-regression	P-value: 0.03 Beta: -0.184

As shown in Table 3, the correlation between quantitative variables of the study shows that there is a negative correlation between admission time and reasonableness of admission time: this means that patients believe shorter admission times to be reasonable. Furthermore, there is a strong positive correlation between perceived quality and satisfaction: in other words, the more the perceived quality, the more will patients be satisfied with the service provided. Furthermore, there was a positive significant relationship between satisfaction and behavioural intention and perceived quality and behavioural intention: this means that higher the patients' satisfaction with the service received, the more are they were willing towards readmission in the same hospital. In a study by Aliman, satisfaction was found to have strong positive effects on intention behaviour (Aliman and Mohamad, 2016). The tests between 'expectations and perceptions', 'gender and satisfaction', and 'gender and expectations' showed a significant relationship. Also, using multiple regression model, gender was found as a significant variable in the model. In other words, on an average, we expect the gap between expectations and perceptions be 0.184 times smaller for men than for women. Generally, men reported a smaller gap in terms of quality of service than women.

5.1 Theoretical contribution

The analysis of service quality enables the hospital management to allocate financial resources to improve performance in areas that have a greater impact on the customer's perception of service quality. However, based on studies conducted on evaluating service quality, no experiment has been done in Iran using the SERVUSE model. Since patients

are one of the most important groups in assessing service quality, the current study aims to examine the views of them.

6 Conclusions

The results of the present study showed that the overall quality of services gap for the three hospitals was negative in hospitals affiliated to Mashhad University of Medical Sciences from the patients' point of view, however in 'empathy' dimension, the perceived quality was more than the expectations of patients that show these hospitals could help their patients feel good, valued, and respected, the evidence shows that there are opportunities to take the necessary measures to improve the quality of services by using tangibles, reliability, responsiveness, assurance, and usability dimensions. Therefore, it is necessary to pay more attention to continuous quality improvement programs in order to achieve the goals of comprehensive quality management and seek more patient satisfaction. Considering that the results of the research show that the 'tangibility of services' is the lowest among other dimensions, it seems that if the physical aspects of the hospital environment, such as the colour of the rooms, light, proper ventilation, cleanliness of health services, nutrition And the modern and advanced equipment will be given more attention by the officials, the customers will benefit from the services more. Also, in this study, the SERVUSE model was used to consider the usability variable, which gives a different look at quality. In the present study, unfortunately, there was a negative gap in this dimension for patients undergoing negative heart surgery, which showed that the hospital system was not usable and effective enough for patients. As mentioned, the usability dimension pays attention to access, getting information, and, especially, understanding by patients. So, this dimension responds to the informational needs of patients. The quality of healthcare can be systematically measured, and hospital managers can consider the results of these measurements in order to develop policies that improve the quality of healthcare services. In addition, health policymakers should rethink and strengthen the public dialogue on health budgets, which can be seen as a development tool rather than a financial burden, emphasising not only economic development but also people's well-being. Due to the fact that this study was conducted cross-sectionally and the quality of services was examined only in a certain period of time. To better understand the existing gaps in service delivery, studies for a longer period of time within each organisation are suggested. These studies can continuously check the quality of services and ensure more certainty about the measures taken to reduce existing gaps.

6.1 Limitation

The limitations were as follows: large number of children among patients younger than two years (due to congenital problems) and middle-aged people who were not able to answer questions correctly reduced the number of people participating in the study. Losing patients, failing to complete the second phase of the questionnaire due to early discharge, and death of patients were also limitations.

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Ethical consideration

The current study is a result of a Master's thesis entitled 'Evaluation of Quality Services Provided in Cardiac Surgery Ward at Hospitals Affiliated to Mashhad University of Medical Sciences based on the SERVUSE Model' with code number 930 974. They were assured that their information would remain confidential and they could exclude themselves from the study if they wanted.

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