



Assessing Patients' Satisfaction on Orthodontic Service Quality Using Modified SERVQUAL Model at Postgraduate Center, International Islamic University Malaysia

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Abstract

Aim: This research aims to evaluate the difference between what orthodontic patients expect and perceive regarding the quality of dental services at the Postgraduate Centre, Kuliyah of Dentistry, International Islamic University Malaysia.

Methods: A cross-sectional study was conducted involving 202 orthodontic patients selected through convenience sampling. A modified 20-item SERVQUAL questionnaire was used to measure patients' expectations before treatment and their perceptions after receiving care. Data were collected during the same visit, and analysis was performed using SPSS version 28, applying Wilcoxon's signed-rank test to evaluate differences between expectations and perception scores. P-value<0.05 considered as significant.

Results: Significant differences were found between patients' expectations and perceptions (P<0.05), except for "waiting time" (Q3), "visually appealing facilities" (Q4), "up-to-date equipment" (Q5), and "toilet cleanliness" (Q20). The highest satisfaction was reported for "neat appearance" (Q6), "politeness" (Q10), "caring attitude" (Q7) and "prompt treatment" (Q15). The smallest satisfaction gaps were observed for "toilet cleanliness" (Q20), "waiting time" (Q3), "up-to-date equipment" (Q5), "visually appealing facilities" (Q4), and "clear explanation of dental issues" (Q12). Overall, patients' perceptions exceeded expectations across all dimensions, with positive gaps, though tangibles (D1) and assurance (D4) showed the least positive differences.

Conclusion: The results indicated that orthodontic patients were generally satisfied with the quality of care received. Regular service evaluation and focused improvements, particularly in tangible and assurance aspects, are recommended to ensure high levels of patient satisfaction.

Keywords: Dental services, Expectation, Perception, SERVQUAL



Background

Service quality can be defined as the extent to which a service provider meets the expectations of its customers. In a healthcare setting, service quality is influenced by both the patient's and provider's opinions and approach, with patient satisfaction being a crucial factor for success. The interaction between the patient and healthcare provider enables the assessment and evaluation of service quality while also providing the provider with insight into the patient's perceptions (1). Patients' perspectives serve as a valuable tool in monitoring and enhancing the quality of healthcare services (2). Ultimately, both patient satisfaction and service quality are vital for the long-term success of healthcare institutions. Healthcare systems are constantly evolving and improving, making it essential to establish a method for assessing outcomes and evaluating patient satisfaction with the services provided (3,4). The SERVQUAL model is a widely recognized and used framework for measuring and assessing the quality of services. The SERVQUAL model is a market-driven assessment model that can be applied to various industries, including dental services, to study and measure customer satisfaction (5). The SERVQUAL model helps determine the gap between customers' expectations and their perceived service quality to improve dental services' overall quality. According to Nordin et al. (6), the SERVQUAL KKM model has been progressively adapted and enhanced over the years to meet the specific needs of the Malaysian healthcare system. Using the SERVQUAL model in dental services enables the evaluation of five key components: tangibles, reliability, responsiveness, assurance, and empathy. By analyzing each of these components, dental service providers can identify areas for improvement and take necessary actions to enhance the quality of their services. In our study, however, SERVQUAL was used with modifications to ensure the instrument remained contextually relevant. This study was conducted at the Postgraduate Centre, Kuliyah of Dentistry, International Islamic University Malaysia, which primarily provides orthodontic treatment to patients of various ages. The modified SERVQUAL instrument was developed to measure patients' expectations and perceptions of service quality during their visit to the Postgraduate Centre. Therefore, this research aims to address that gap by examining the satisfaction level of orthodontic patients using a context-appropriate SERVQUAL model. The evaluation is structured around the five

core dimensions described above. The specific objectives are to assess patients' expectations and perceptions of the quality of dental services at the Postgraduate Centre and to determine the extent of the discrepancy between expected and perceived service quality.

Methods

Study Design and Population

This cross-sectional study was conducted at the Postgraduate Centre, Kuliyah of Dentistry, International Islamic University Malaysia, Kuantan Campus. The study population consisted of orthodontic patients aged above 18 years who attended appointments for fixed orthodontic appliance treatment at Postgraduate Clinic. Patients were recruited through convenience sampling. The final sample included individuals with a mean age of 25.9 years (SD=7.8).

Patients were excluded if they were <18 or were not treated by postgraduate students. Those agreeing to participate were invited to complete a self-administered questionnaire during their visit. The questionnaire, which covered demographic information, expectations, and perceptions of service quality, was completed toward the end of their clinical session.

Sample Size

The sample size was calculated using G*Power version 3.1.9.7 (7). Statistical analysis using paired t-tests determined the sample size with an alpha level of 0.05, a power of 0.80, and a small effect size ($d_z=0.2$). The calculated minimum sample size was 199, and the study included 202 participants.

Instrument

The survey evaluated service quality using the SERVQUAL framework, covering five key dimensions: tangibles, assurance, responsiveness, empathy, and reliability. Additionally, it included four dimensions from the Ministry of Health (MOH)—professionalism, teamwork, caring services, and service outcomes—adapted from John et al. (2). The questionnaire was structured in two parts. The first part contained a consent form and demographic questions about age, gender, educational background, marital status, occupation, and number of clinic visits. The second part, split into expectations and perceptions, comprised 20 items assessing the nine service quality dimensions. Patients rated their expectations and perceptions using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Participants completed the

questionnaire once; however, the expectation section was filled out prior to the initiation of treatment and before any clinical procedures were performed, while the perception section was completed after treatment, during a subsequent clinical visit, once the participants had experienced the service. Although the questionnaire was administered as a single instrument, data for expectations and perceptions were collected at two distinct time points—before and after at least one treatment session, respectively. The difference between the two sections was used to calculate the satisfaction gap.

Statistical Analysis

This study used IBM SPSS Statistics Software version 28 to analyze data. The sample characteristics are summarized through a descriptive analysis by frequency (n) and percentage (%). The means and standard deviations were employed to assess patients' expectations and perceptions. A Wilcoxon signed-rank test was conducted to determine whether there was a

significant difference between expectation and perception. Ethical approval was granted by the University Ethics Committee (IREC 2024-034).

Results

Table 1 (demographic data) shows that most of the patient population was between 20 (69.3%) and ≥40 (6.9%). Male patients (21.3%) were outnumbered by females (78.3%). The distribution of marital status revealed that single patients were more numerous (74.8%) compared to married patients (23.3%) and divorced patients (1.9%). A significant portion of patients (92.1%) held tertiary-level educational qualifications, indicating a high degree of academic achievement among the study participants. Table 2 presents the reliability of respondents' expectations and perceptions, with internal consistency ranging from 0.871 to 0.980 for expectations and 0.691 to 0.967 for perceptions, demonstrating good to excellent reliability across all measured dimensions.

Table 1. Demographic characteristics of respondents

Variables	n (%)
Age (years)	
18-19	21 (10.4)
20-29	140 (69.3)
30-39	25 (12.4)
>40	14 (6.9)
Gender	
Male	43 (21.3)
Female	159 (78.3)
Marital Status	
Single	151 (74.8)
Married	47 (23.3)
Divorced	4 (1.9)
Education Level	
No formal education	0 (0.0)
Primary education	1 (0.5)
Secondary education	15 (17.4)
Tertiary education	186 (92.1)
Occupation	
Government	36 (17.8)
Private	36 (17.8)
Self employed	13 (6.4)
Unemployed	8 (4.0)
Student	107 (53.0)
Others	2 (1.0)
Number of Clinical Visits	
First time	2 (1.0)
Second times	0 (0.0)
Third times	2 (1.0)
More than 3 times	198 (98)

Table 2. Reliability analysis for the Dimensions

Dimensions		Items	Cronbach's α	
			Expectation	Perception
D1	Tangibles	Q4, Q5, Q6, Q20	0.921	0.823
D2	Reliability	Q2, Q3, Q14	0.875	0.691
D3	Responsiveness	Q1, Q13, Q15	0.871	0.856
D4	Assurance	Q10, Q11, Q12	0.944	0.900
D5	Empathy	Q7, Q8, Q9	0.941	0.912
D6	Outcome	Q16	-	-
D7	Caring services	Q2, Q10, Q13, Q15	0.930	0.890
D8	Teamwork	Q11, Q17	0.892	0.844
D9	Professionalism	Q1, Q2, Q7, Q8, Q9, Q11, Q12, Q14, Q16, Q18, Q19	0.980	0.967

Expectation

According to Tables 3 and 4, patients had the highest expectations for “maintaining strong work discipline” (Q18, 98.5%), followed by “offering assistance to patients when required” (Q13, 98.0%), “clearly explaining patients’ dental conditions” (Q12, 97.6%), “delivering appropriate services” (Q14, 97.6%), and “providing highly committed care” (Q19, 97.6%). Additionally,

patients prioritized assurance (D1), reliability (D2), and empathy (D5) as the most essential dimensions. Assurance reflects the courteous and respectful interactions by postgraduate students with patients. Reliability is demonstrated through the students’ punctuality and consistent care delivery. Empathy highlights the students’ attentiveness and thorough understanding of patients’ needs.

Table 3. Comparison of expectation, perception, and satisfaction for each question

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Expectation					Perception			Satisfaction			
	Description	Score 4-5 ^a (%)	Median	IQR	Score 4-5 ^b (%)	Median	IQR	Mean	95% CI	Z-Statistics	p-value
Q1	Student gives accurate appointment details	96.5	5	1	99.0	5	0	0.178	0.081, 0.276	-3.617	0.001
Q2	Student provides services on time	96.0	5	1	98.8	5	0	0.139	0.053, 0.224	-3.224	0.001
Q3	Short waiting time at registration	93.1	5	1	91.6	5	1	-0.025	-0.145, 0.095	-0.853	0.393
Q4	Visually appealing facilities	96.1	5	1	99.0	5	1	0.089	0.005, 0.174	-1.961	0.050
Q5	Student uses up-to-date equipment	96.5	5	1	98.5	5	1	0.040	-0.046, 0.125	-0.794	0.427
Q6	Students and staff maintain a neat appearance	97.0	5	1	99.5	5	0	0.252	0.161, 0.344	-5.649	0.001
Q7	Students give personal attention	95.1	5	1	98.5	5	0	0.213	0.129, 0.297	-4.903	0.001
Q8	Student understands patients' needs	97.0	5	1	99.0	5	0	0.163	0.082, 0.245	-3.978	0.001
Q9	Student assists wholeheartedly	97.0	5	1	98.5	5	0	0.144	0.066, 0.221	-3.674	0.001
Q10	Student is polite	96.5	5	1	99.0	5	0	0.223	0.139, 0.306	-5.271	0.001
Q11	Student is knowledgeable about treatment	97.1	5	1	99.0	5	0	0.104	0.028, 0.180	-2.665	0.008
Q12	Student explains dental problems clearly	97.6	5	1	99.0	5	0	0.094	0.017, 0.171	-2.382	0.017
Q13	Student is ready to help	98.0	5	1	99.5	5	0	0.158	0.076, 0.241	-3.798	0.001
Q14	Student provides suitable services	97.6	5	1	99.0	5	0	0.124	0.048, 0.200	-3.245	0.001
Q15	Student starts treatment promptly	94.1	5	1	98.0	5	0	0.213	0.112, 0.314	-4.060	0.001
Q16	Student provides effective treatment	97.5	5	1	99.5	5	0	0.134	0.062, 0.205	-3.723	0.001

Table 3. Comparison of expectation, perception, and satisfaction for each question

	Description	Expectation			Perception			Satisfaction		Z-Statistics	p-value
		Score 4-5 ^b (%)	Median	IQR	Score 4-5 ^b (%)	Median	IQR	Mean	95% CI		
Q17	Students and staff work as a team	97.5	5	1	99.5	5	0	0.158	0.083, 0.234	-4.413	0.001
Q18	Student shows good work discipline	98.5	5	1	99.5	5	0	0.178	0.100, 0.256	-4.708	0.001
Q19	Student provides treatment with a high commitment.	97.6	5	1	97.6	5	0	0.153	0.076, 0.231	-4.110	0.001
Q20	Toilets are kept clean	96.6	5	1	94.0	5	1	-0.069	-0.169, 0.030	-1.571	0.116

IQR: Interquartile range, CI: confidence interval. ^aWilcoxon signed-rank test, ^bRespondents giving scores 4 and 5

Table 4. Demographic characteristics and satisfaction for each dimension

	Expectation		Perception		Satisfaction		Z Statistics	P Value ^a
	Mean±SD	Median (IQR)	Mean±SD	Median (IQR)	Mean	95% CI		
D1 ^c	4.60±0.58	5.0(1.0)	4.70±0.45	5.0(1.0)	0.097	0.026,0.167	-2.759	0.006
D2 ^c	4.64±0.62	5.0(1.0)	4.79±0.43	5.0(0.0)	0.150	0.072,0.225	-3.844	0.001
D3 ^c	4.56±0.68	5.0(1.0)	4.73±0.48	5.0(1.0)	0.173	0.084,0.262	-3.865	0.001
D4 ^c	4.68±0.58	5.0(1.0)	4.80±0.42	5.0(0.0)	0.123	0.052,0.196	-3.474	0.001
D5 ^c	4.63±0.66	5.0(1.0)	4.79±0.45	5.0(0.0)	0.158	0.081,0.236	-4.053	0.001
D6 ^d	4.68±0.60	5.0(1.0)	4.81±0.40	5.0(0.0)	0.134	0.062,0.205	-3.723	0.001
D7 ^e	4.61±0.62	5.0(1.0)	4.80±0.42	5.0(0.0)	0.183	0.178,0.259	-4.767	0.001
D8 ^e	4.68±0.58	5.0(0.6)	4.81±0.40	5.0(0.0)	0.131	0.061,0.202	-4.137	0.001
D9 ^e	4.67±0.58	5.0(1.0)	4.81±0.40	5.0(0.0)	0.139	0.069,0.208	-4.096	0.001

IQR: interquartile range, CI: confidence interval, MOH: Ministry of Health

^aWilcoxon signed rank test,

^bRespondents giving scores 4 and 5

^cSERVQUAL dimension (D1: Tangible, D2: Reliability, D3: Responsiveness, D4: Assurance, D5: Empathy)

^dService outcome

^eMOH core values (D7: Caring service, D8: Teamwork, D9: Professionalism)

Perception

The respondents' perception of the service quality received was lowest for "registration waiting time" (Q3, 91.6%), followed by "cleanliness of the toilet" (Q20, 94.0%). Among the SERVQUAL dimensions, the lowest perception of patients was tangibles (D1), followed by responsiveness (D3). Tangibles, including the physical environment and facilities, were crucial to patient satisfaction.

Satisfaction Gap

Significant differences were found between patients' expectations and perceptions ($P < 0.05$), except for "waiting time" (Q3), "visually appealing facilities" (Q4), "up-to-date equipment" (Q5), and "toilet cleanliness" (Q20). The highest satisfaction was reported for "neat appearance" (Q6), "politeness" (Q10), "caring attitude" (Q7) and "prompt treatment" (Q15). The smallest satisfaction gaps were observed for "toilet cleanliness" (Q20), "waiting time" (Q3), "up-to-date equipment" (Q5), "visually appealing facilities" (Q4), and "clear explanation of dental issues" (Q12). Overall, patients' perceptions exceeded expectations across all dimensions, with positive

gaps, though tangibles (D1) and assurance (D4) showed the least positive differences. Patients expressed high satisfaction with the corporate culture, particularly with caring services (D7), followed by professionalism (D9), outcomes (D6), and teamwork (D8), reflecting the high-quality care, professionalism, and collaborative efforts at the Postgraduate Centre.

Discussion

In this study, patients' perceptions of service quality exceeded their expectations across all SERVQUAL dimensions, leading to positive gaps, indicating that the postgraduate students deliver services at a higher level than patients had anticipated. However, satisfaction levels varied across different dimensions. Among these, tangibles are the most concerning dimensions for patients, where they have the lowest satisfaction but are still within the positive gaps. This finding aligns with previous research conducted by Ibrahim et al. (8) and Akbar et al. (9), which emphasizes the impact of physical facilities on patient satisfaction in healthcare settings.

The second SERVQUAL dimension, which is rated lower than the other dimensions in patient satisfaction, is assurance. This finding is consistent with studies by Ibrahim et al. (8), which also identified assurance as an area of concern in patient satisfaction. However, this contrasts with the findings of John et al. (2), who reported assurance as the highest-rated dimension regarding patient satisfaction. The emphasis on tangibles and assurance highlights the significance of dentist-patient interactions and the importance of a professional and well-maintained clinical environment. Patients in this study were primarily expected to trust the postgraduate students, have confidence in their decision-making, and feel assured that their best interests were prioritized during treatment. This perspective aligns with their perception, where they depend on the postgraduate students to act ethically and provide high-quality treatment in a clean, welcoming, and supportive setting. Although those two dimensions received the lowest satisfaction among all dimensions, they still produced a positive gap between expectations and perceptions.

On top of that, responsiveness as a strong performance dimension that emphasized efficient service and a genuine eagerness to assist patients in receiving the highest satisfaction score, which was consistent with the findings of Ibrahim et al. (8), Sajadi et al. (10) and Sharka et al. (11). This suggests that patients felt their concerns were handled quickly and effectively, with postgraduate students demonstrating a proactive approach to addressing their needs. These results highlight the postgraduate center's ability to deliver timely care and efficient patient management. Furthermore, maintaining this high level of responsiveness will require consistent attention to managing patient flow and addressing potential barriers to timely care. In contrast, a study at the University of Palestine reported that responsiveness had the lowest satisfaction due to delayed response time and lack of effective communication (12).

Next, empathy emerged as the second most highly rated aspect of patient satisfaction, consistent with the findings of Qazi et al. (1) and Adebayo et al. (13), which were also conducted in government hospital-based settings, indicating that patients felt understood and that the postgraduate students acknowledged their concerns. This finding is particularly encouraging, as it demonstrates that postgraduate students successfully provided compassionate and patient-centered care despite the challenges of a teaching environment. To sustain and enhance this achievement, ongoing professional development in empathy and

interpersonal communication skills, comparable to the competencies observed in seasoned clinicians, should be prioritized to strengthen this vital aspect of patient care. Additionally, the caring service dimension, a core component of the Ministry of Health (MOH) framework, received the highest satisfaction ratings, corroborating findings by Ibrahim et al. (8). This elevated satisfaction with caring services at the Postgraduate Centre, Kulliyah of Dentistry, International Islamic University Malaysia, underscores the ability of postgraduate students to deliver compassionate and patient-centered care, reflecting the MOH's emphasis on a corporate culture of empathy and attentiveness. This success is likely attributable to International Islamic University Malaysia's training programs, which prioritize patient-focused care and align closely with MOH values. Conversely, these results diverge from John et al. (2), who reported the caring service dimension as having the lowest satisfaction scores, possibly due to differences in clinical settings or patient expectations. This is because government clinics handle a high number of patients daily and may not have sufficient time to maintain the quality of care services in practice compared to the Postgraduate Centre of International Islamic University Malaysia, which only receive a smaller number of patients each day. As a result, they can dedicate more time to patients and focus on the care dimension in their practice. This allows them to provide more personalized attention, ensuring that patient needs are thoroughly addressed and enhancing overall service satisfaction. Hence, the difference in patient volume highlights the importance of manageable workloads in maintaining high-quality care, as smaller patient numbers enable practitioners to prioritize patient-centered approaches and build stronger patient-provider relationships.

Moreover, the outcome dimension aligns with a previous study conducted in the same setting, which reported a positive satisfaction gap (8). However, this contrasts with John et al. (2), who reported a negative satisfaction gap. The success of orthodontic treatment is primarily driven by meticulous planning, precise execution, and continuous assessment throughout the treatment process. Studies have shown that evidence-based approaches, such as regular monitoring and timely adjustments, significantly improve treatment efficiency and patient outcomes (14). Additionally, adherence to best practices contributes to improved treatment efficiency, reduced complications, and enhanced patient satisfaction (15). Therefore, by prioritizing thorough evaluation and refinement of treatment protocols,

orthodontic practitioners can achieve excellent outcomes, ensuring long-term stability and overall patient well-being.

Conclusion

In all aspects, patients received the provided services, surpassing their initial expectations, which led to a positive satisfaction gap. Caring service (D7) in treatment was associated with the highest satisfaction, followed by responsiveness (D3) and empathy (D5). Regular assessment and maintenance, particularly in the tangible aspects, are crucial for sustaining and improving patient satisfaction. The findings provide a key reference for future studies and service enhancements, supporting the continuous improvement of orthodontic treatment at the Postgraduate Centre while ensuring exceptional orthodontic service that meets and exceeds patient expectations. However, the sample was limited to a single institution, which may affect the generalizability of the findings to other settings. Additionally, the study relied on self-reported measures, which may be influenced by response bias. Future research should consider expanding the study across multiple centers and incorporating qualitative methods to gain deeper insights into patient perceptions. Longitudinal studies are also recommended to assess trends in satisfaction and the long-term impact of service quality improvements.

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Data Availability Statement

The data presented in this study are available on request from the corresponding author.

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Conflicts of Interest

The authors declare that there are no conflicts of interest.

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