RESEARCH ARTICLE

Patient satisfaction and perception of quality care in orthodontic services using the SERVQUAL model at a tertiary care hospital

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Abstract

Objective: To assess patient satisfaction and the perceived quality of orthodontic care in a tertiary care setting, focussing on identifying gaps between patients' expectations and perceptions.

Method: The cross-sectional study was conducted at the Department of Orthodontics, Aga Khan University Hospital, Karachi, in January 2025, and comprised orthodontic patients undergoing treatment for at least six months. Data was collected using a structured SERVQUAL-based questionnaire which was distributed online. The primary outcome was the difference between expectation and perception scores for each SERVQUAL dimension of tangibles, reliability, responsiveness, assurance and empathy. Data was analysed using SPSS for windows (version 23.0, SPSS Inc, Chicago)

Results: Of the 58 patients, 41(70.7%) were females with mean age 24.2±5.5 years and 17(29.3%) were males with mean age 22.4±12.2 years. A significant gap was observed between patients' expectations and perceptions in reliability and empathy dimensions ($p<0.05$). Conversely, the highest perception scores were noted in assurance and responsiveness dimensions ($p<0.05$).

Conclusions: There were significant gaps between patients' expectations and perceptions with respect to reliability and empathy, while high satisfaction levels were noted for assurance and responsiveness.

Key Words: Patient satisfaction, Service quality, Orthodontic care, SERVQUAL model

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Introduction

Quality care and patient satisfaction are fundamental priorities in modern healthcare, particularly in orthodontics, where long-term treatment plans and frequent interactions between patients and providers make patient perceptions a pivotal factor in achieving success.[1] The effectiveness of orthodontic care is not exclusively determined by clinical outcomes, but also by the extent to which patients' expectations regarding service quality and overall experience are met. Factors such as the cleanliness of facilities, the timeliness of services, the competence of providers, and effective communication significantly influence patient satisfaction. These aspects are especially crucial in orthodontics, where patient compliance and treatment outcomes are closely linked to trust and satisfaction.[2]

The SERVQUAL model, introduced by Parasuraman et al.,[3] is a widely recognised framework (Figure 1) for evaluating service quality. It compares patients' expectations with their perceptions across five key dimensions: tangibles (physical facilities and appearance), reliability (the ability to deliver services dependably), responsiveness (the willingness to assist patients promptly), assurance (knowledge and courtesy of staff that instills confidence), and empathy (personalised attention and care) (Figure 2). By analysing the gaps between expectations and perceptions, the SERVQUAL model[3] highlights areas of

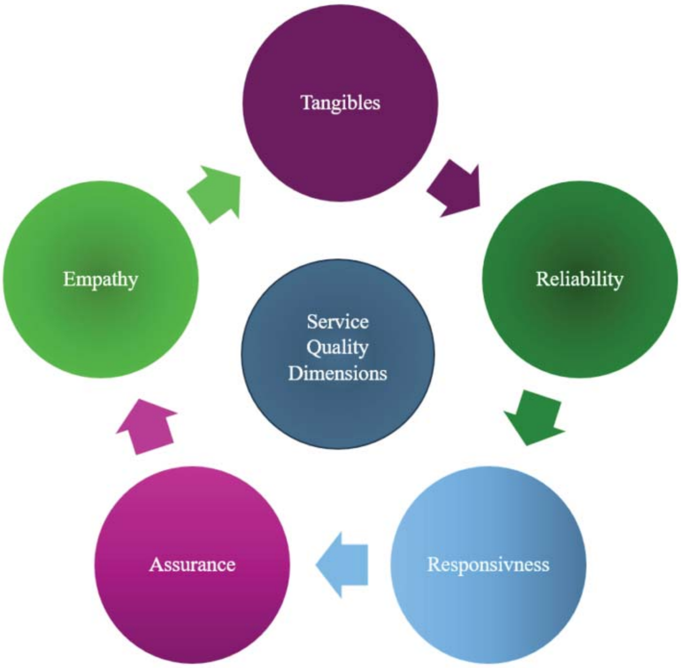

Figure-1: SERVQUAL MODEL Framework

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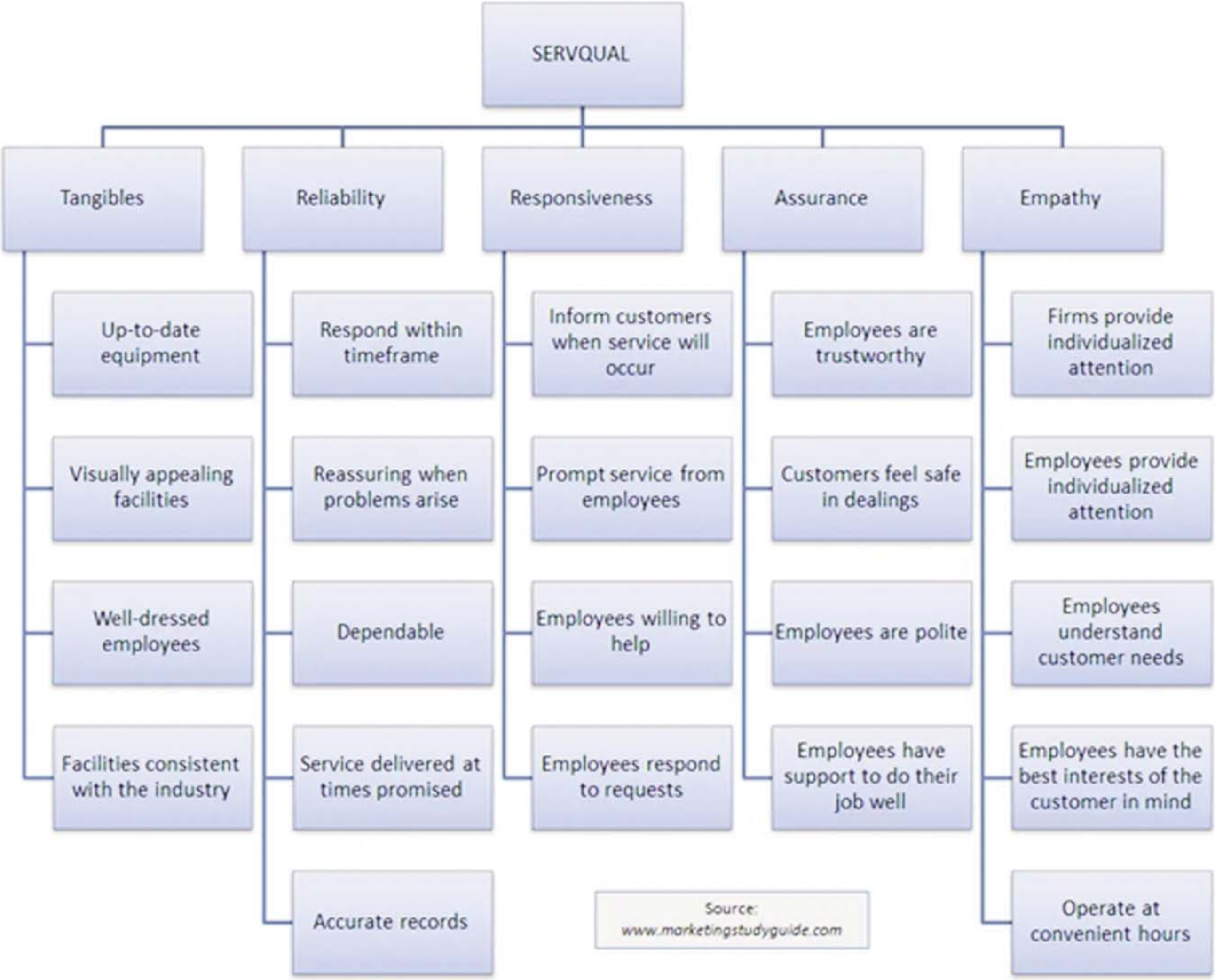

Figure-2: Structure for the SERVQUAL questionnaire.

strength, and identifies opportunities for improvement. While the model has been extensively applied in various healthcare contexts, its use in orthodontic settings remains limited.[4]

Orthodontic patients typically expect high standards of cleanliness, modern facilities, adherence to treatment schedules, and prompt attention to their concerns. However, discrepancies between these expectations and their actual experiences can lead to dissatisfaction, and impact treatment compliance, ultimately affecting clinical outcomes. Identifying and addressing these gaps in service quality at a tertiary care hospital can provide valuable insights for improving patient-centred care and overall service delivery.[5]

The current study was planned to explore the gaps between patients' expectations and perceptions of service quality in orthodontic services using the SERVQUAL model.[3]

Subjects and Methods

Following approval of exemption by the institutional ethical review committee (ERC # 2024-10887-32154), a cross-sectional study was conducted in January 2025 at the Department of Orthodontics, Aga Khan University Hospital (AKUH), Karachi. The sample size was calculated using the formula: n=8(CV2 [1+(1-PC)2]/(PC)2.[6] The target was to detect at least a 10% change in the mean scores, and a 20% or less change in the coefficient of variation, with a two-sided 5% level of significance.[7] The sample size was inflated by 10% to account for loss to follow-up or non-response rate, and to achieve 80% power. The sample was raised using non-probability consecutive sampling technique. Those included were orthodontic patients of either gender who were either undergoing or had completed treatment at the hospital for at least six months. Patients not willing to participate, those with incomplete records, and those undergoing orthodontic treatment at other facilities were excluded.

Patients were approached during their scheduled visits to the orthodontic department, and those meeting the eligibility criteria were invited to participate. Data was collected after obtaining informed consent using a questionnaire, which was either a paper-based hard copy or a soft copy that was online, depending on each patient's preference. The survey was designed to take approximately 10 minutes to complete. To increase participation, reminders were sent every five days for online responses, and a two-week window was provided for survey completion.

The data-collection tool was a customized SERVQUAL3 (SERVICE QUALITY) questionnaire, which was divided into two sections. Section A captured demographic details, such as age, gender and education level, while Section B assessed patients' expectations and perceptions of service quality based on the five SERVQUAL dimensions. Each item was rated on a 5-point Likert scale, ranging from 1 = strongly disagree to 5 = strongly agree.

The SERVQUAL gaps were calculated by subtracting expectation scores from perception scores for each item in the questionnaire. A positive gap score indicated that perceptions exceeded expectations, reflecting areas where the service surpassed patient expectations. A negative gap score revealed that perceptions fell short of expectations, identifying areas requiring improvement. A gap score of zero suggested that expectations were exactly met.

Data was analysed using SPSS for windows (version 23.0, SPSS Inc, Chicago). Descriptive statistics, including frequencies, percentages, means and standard deviations, were calculated for each SERVQUAL dimension and item. Normality of the gap scores was assessed using the Shapiro-Wilk test. Based on the normal results, paired t-test was used to compare the differences between expectations and perceptions. $P<0.05$ was considered significant. Cronbach's alpha was calculated to assess the reliability of the SERVQUAL questionnaire.

Results

Of the 58 patients, 41(70.7%) were females with mean age 24.2±5.5 years and 17(29.3%) were males with mean age 22.4±12.2 years.

Cronbach's alpha values for perception items ranged 0.68-0.74 (Table 1). All the coefficients indicated good internal consistency (Table 2).

A significant positive gap was found for staff professionalism and hygiene in the tangibility dimension (+0.63, $p<0.001$). In the reliability dimension, the largest negative gap (-1.01, $p<0.001$) was noted for timely scheduling of appointments. In the responsiveness dimension, the highest gap (+0.41, $p<0.001$) was seen in the responsiveness of orthodontists and staff to patient needs. In the assurance dimension, positive gaps were noted for trust in safety protocols (+0.75, $p<0.001$) and the orthodontist's competence (+0.25, $p=0.008$). T In the empathy dimension positive gaps were seen for attentiveness and care (+0.41, $p<0.001$), but a significant negative gap (-0.82, $p<0.001$) was observed for the clinic's sensitivity to financial needs (Table 3).

Table-1: Reliability analysis, calculation of Cronbach's alpha (α) for the five dimensions.

		Cronbach's α	
	SERVQUAL Dimension	Perception	Expectation
1	Tangibility	0.72	0.98
2	Empathy	0.72	0.74
3	Assurance	0.74	0.83
4	Reliability	0.74	0.95
5	Responsiveness	0.68	0.94

Table-2: Pearson correlation matrix for the SERVQUAL Model.

	Tangibility	Reliability	Responsiveness	Assurance	Empathy
Tangibility	1				
Reliability	0.5**	1			
Responsiveness	0.4**	0.5**	1		
Assurance	0.6**	0.5**	0.7**	1	
Empathy	0.3**	0.7**	0.5**	0.6**	1

Correlation is significant at the 0.01 level**

Table-3: Patients' scores for expectations and perceptions.

SERVQUAL Dimensions	Items	Mean ± S.D				Gap	P - value
		Perceptions		Expectations			
Tangibility	T1	4.81	0.39	4.87	0.32	-0.06	0.285
	T2	4.58	0.64	4.31	0.46	0.27	0.017
	T3	4.82	0.46	4.18	0.39	0.63	< 0.001**
	T4	4.53	0.70	4.89	0.30	-0.03	0.001*
Reliability	R1	3.74	1.00	4.75	0.43	-1.01	< 0.001**
	R2	4.74	0.47	4.32	0.47	0.41	< 0.001**
	R3	4.39	0.83	4.34	0.47	0.05	0.691
	R4	4.70	0.49	4.36	0.48	0.34	< 0.001**
	R5	4.69	0.53	4.34	0.47	0.34	0.001*
Responsiveness	Res1	4.79	0.48	4.41	0.49	0.37	< 0.001**
	Res2	4.67	0.54	4.39	0.49	0.27	0.008*
	Res3	4.77	0.46	4.36	0.48	0.41	< 0.001**
	Res4	4.55	0.77	4.41	0.49	0.13	0.280
Assurance	A1	4.63	0.61	4.44	0.50	0.18	0.086
	A2	4.65	0.68	4.46	0.50	0.18	0.101
	A3	4.69	0.46	4.43	0.49	0.25	0.008*
	A4	4.87	0.32	4.12	0.32	0.75	< 0.001**
Empathy	E1	4.56	0.84	4.50	0.50	0.06	0.584
	E2	4.46	0.79	4.53	0.50	-0.06	0.542
	E3	4.56	0.79	4.65	0.47	-0.08	0.482
	E4	3.96	1.18	4.79	0.40	-0.82	< 0.001**
	E5	4.65	0.57	4.24	0.43	0.41	< 0.001**

Gap: Perception score - Expectation score. SD: Standard deviation.*p<0.05, **p<0.001, Paired t-test

Discussion

The assessment of service quality in orthodontic care has gained considerable attention in recent years, particularly because of its impact on patient satisfaction and treatment outcomes. The SERVQUAL model evaluates service quality across five key dimensions: tangibles, reliability, responsiveness, assurance and empathy.[3] It provides a valuable framework for assessing and addressing gaps in healthcare services. The current study identified significant differences in some dimensions, while others showed alignment between what patients expected and what they experienced, reflecting areas for both improvement and where excellence was attained.

In the tangibility dimension, significant gaps were observed in the perceived modernity and maintenance of orthodontic equipment, as well as the clarity and appeal of treatment materials. Tangibles are often the most immediately visible aspect of healthcare services, and significantly influence patient perceptions of quality. The current findings are consistent with the findings of Bakhtiar et al.[8] who reported a similar gap in tangibles when assessing dental services in Shiraz, particularly in public clinics where resources were often limited compared to private settings. Similarly, Riaz et al.[9] observed that public dental hospitals in Pakistan faced significant challenges in maintaining modern infrastructure, which adversely impacted patient satisfaction. Modernising equipment and improving clinical environments are key strategies to address these gaps, as highlighted by Kalaskar et al.[10] who demonstrated that visually appealing and technologically advanced clinics significantly enhance patient confidence and satisfaction. Orthodontic practices that prioritise visually appealing, clear treatment materials not only improve patient understanding, but also foster trust and confidence in the treatment process.

In the reliability dimension, gaps were observed in the timeliness of appointments, highlighting a need for better scheduling and time management. Timeliness is particularly critical in orthodontics, where long-term treatment necessitates frequent visits. Sitaraman et al.[11] similarly reported reliability gaps in dental services, emphasising that delayed appointments and inconsistent care delivery were among the primary causes of dissatisfaction However, in the current study, the other elements of reliability, such as accurate record-keeping and consistent service, achieved higher satisfaction scores, reflecting the competence of orthodontic staff, mirroring the findings of Aboubakr and Bayoumy[12] who observed strong reliability scores in educational dental settings due to well-established systems. Addressing scheduling inefficiencies through automated systems and improved communication channels, as recommended by Iqbal et al.,[13] can significantly enhance patient satisfaction in this domain.

The responsiveness dimension, which reflects the staff's ability to address patient needs promptly, was one of the most positively rated aspects in this study, which is consistent with the findings of Rocha et al.[14] who reported that responsiveness was one of the strengths in dental care services, especially in clinics that prioritised patient communication and issue resolution. Al-Omari et al.[15] noted that responsiveness is a critical determinant of satisfaction in dental services, as it reflects the provider's commitment to addressing patient needs promptly. Responsiveness is especially important in orthodontics, where frequent follow-ups provide ample opportunities for interaction, and effective responsiveness builds trust and fosters stronger patient-provider relationships. Encouragingly, no significant gaps were noted in this dimension, indicating a well-functioning system in this aspect of service delivery. Maintaining strong communication practices and patient engagement strategies can sustain these high scores.

The assurance dimension, which evaluates patient confidence in the provider's skills and safety practices, also recorded high satisfaction levels in this study, suggesting that the patients were confident in the expertise of their orthodontists, and felt assured by the clinic's safety protocols. Al-Omari et al.[15] similarly found that assurance was among the highest-scoring dimensions in dental services, particularly in settings where providers emphasised clear communication of procedures and had visible adherence to safety measures. Ravangard et al.[16] demonstrated that assurance is a critical predictor of patient loyalty, underscoring its importance in orthodontics. Clinics can build on this strength by continually training staff and maintaining transparent communication about safety and quality standards.

In contrast, the empathy dimension showed mixed results, with significant gaps in areas, like flexibility in scheduling and sensitivity to financial concern. Empathy is a cornerstone of patient-centred care, reflecting the provider's ability to understand and address individual patient needs. These findings align with Rocha et al.[13] who highlighted empathy as a challenging dimension, particularly in dental care settings serving diverse populations with varying financial and logistical constraints. Riaz et al.[9] also noted that empathy gaps were common because resource limitations often prevented personalised care. Addressing these gaps involves adopting patient-friendly practices, offering flexible appointment hours, financial counselling and payment plans comprising instalments. Aboubakr and Bayoumy[12] emphasised the role of empathy in fostering trust, particularly in educational settings where personalised attention is critical.

The gaps identified in tangibles, reliability and empathy dimensions underscore the need for targetted improvements in orthodontic service delivery. Upgrading facilities, modernising equipment, and enhancing clinic aesthetics are critical steps for addressing tangibles.[10] Reliability gaps, particularly in terms of punctuality, require better appointment and communication systems.[13] Finally, prioritising empathetic care by offering more personalised solutions and addressing financial constraints can foster a more supportive treatment environment.[9,14]

Conversely, the strengths observed in terms of responsiveness and assurance provide valuable lessons for maintaining patient satisfaction. Responsiveness reflects a clinic's ability to engage patients effectively and resolve their concerns promptly, a dimension highlighted as a key strength by both Rocha et al.[14] and Al-Omari et al.[15] Assurance, characterised by trust in the provider's knowledge and adherence to safety protocols, remains an essential component of orthodontic care. Ravangard et al.[16] noted that high assurance scores significantly improve patient loyalty, emphasising the importance of maintaining this standard.

The current study benefits from the application of the validated SERVQUAL model, providing a thorough evaluation of orthodontic service quality and highlighting actionable gaps pertinent to long-term care. The real-time collection of data during treatment reduced recall bias and ensured reliable responses. However, the study has its limitations that include the single-centre scope, the potential for response bias in self-reported data, and the absence of perspectives from orthodontists and clinic staff. Future studies should try to overcome these limitations by incorporating a multicentre approach to improve the generalisability of findings, and by including qualitative assessments, such as interviews or focus groups, to gain a more comprehensive understanding of service quality from both patients' and providers' perspectives.

Conclusion

There were significant gaps in tangibility, reliability and empathy, requiring improvements in equipment modernisation, punctuality and addressing patient-specific needs. Responsiveness and assurance emerged as strengths, indicating high satisfaction with staff attentiveness, communication and safety protocols. Addressing gaps in weaker SERVQUAL dimensions, while maintaining strengths in responsiveness and assurance, can ensure a balanced improvement in service quality.

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