

EVALUATING THE IMPACT OF SERVICE QUALITY ON PATIENT SATISFACTION IN DENTAL CARE CENTERS

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Received: 18 January 2026; Revised: 10 April 2026; Accepted: 11 April 2026

<https://doi.org/10.51847/P0dK1vQxWJ>

ABSTRACT

Patient satisfaction is widely recognized as a critical indicator of service effectiveness and quality in healthcare systems, particularly in dental care settings where service encounters are highly interactive and emotionally sensitive. This study investigates the effects of service quality dimensions on patient satisfaction in dental care centers using the SERVQUAL framework. Data were collected through a structured questionnaire administered to patients who had recently utilized dental services, and structural equation modeling (SEM) was employed to analyze the relationships among constructs. The results of the measurement model assessment demonstrate strong psychometric properties, with all constructs meeting established criteria for internal consistency reliability, convergent validity, and discriminant validity. Structural model findings reveal that empathy, reliability, assurance, and responsiveness have significant positive effects on patient satisfaction. Among these, empathy emerges as the most influential factor, highlighting the importance of personalized attention, effective communication, and provider care. In contrast, tangibility exhibits a positive but statistically insignificant effect, suggesting that physical facilities play a secondary role compared to human-centered and process-oriented service attributes. Overall, the model explains 75% of the variance in patient satisfaction, indicating strong explanatory power and offering valuable insights for enhancing patient-centered dental care services.

Key words: Patient satisfaction, Service quality, Dental care centers, Healthcare services, Patient-centered care.

Introduction

The global service industry is evolving rapidly, with an increasing focus on client satisfaction as the primary driver for business sustainability [1]. Within dental care, evaluating patient satisfaction is no longer optional; it is a critical requirement for assessing service quality and formulating effective improvement strategies [2-5]. Patient perceptions serve as a vital indicator for evaluating the efficacy of clinical treatments and the quality of the patient-dentist interaction [6-8]. This commitment to service excellence and patient-centric care is particularly relevant in the context of healthcare transformation from a seller's to a consumer's market, where patient needs dictate service quality [9]. Understanding these needs is paramount, as patient satisfaction significantly influences treatment adherence, continued patronage, and overall loyalty within dental healthcare [6, 10]. Furthermore, patient satisfaction not only enhances the institution's image, leading to increased utilization of healthcare services, but also contributes to market share expansion [11]

Recent evidence suggests that patients who express higher satisfaction levels exhibit improved adherence to treatment protocols, fewer missed appointments, and lower levels of anxiety regarding dental procedures [2, 12]. Despite its importance, comprehensive evaluations of service quality by patients remain relatively scarce in some regions [2, 13, 14]. This paper aims to bridge this gap by synthesizing current research on the impact of service quality dimensions on overall patient satisfaction. Specifically, this study will

critically examine the five core SERVQUAL dimensions—reliability, responsiveness, assurance, empathy, and tangibles—and their differential impact on patient perceptions of quality within the dental care context [15]. This assessment is crucial given that patient satisfaction directly correlates with compliance and the overall effectiveness of dental care [16]. Building upon this, clinic managers must prioritize tangibility, assurance, and empathy while strategically planning for reliability and responsiveness to enhance safe service quality [17].

In contemporary healthcare systems, patient satisfaction has become a central indicator of service performance and institutional sustainability, particularly as healthcare delivery increasingly shifts toward patient-centered models. Beyond reflecting patient perceptions, satisfaction is closely associated with treatment adherence, continuity of care, reduced anxiety, and long-term patient loyalty. Within this context, dental care services present a unique and critical setting in which service quality perceptions play a decisive role, given the high level of patient involvement, emotional sensitivity, and direct interaction between healthcare providers and patients. Unlike many other medical services, dental care is often characterized by repeated visits, elective procedures, and heightened patient anxiety, making service quality not only a clinical concern but also an experiential one. Patients frequently evaluate dental services based not solely on treatment outcomes but also on how care is delivered, including communication clarity, empathy, responsiveness, and trustworthiness. Consequently, understanding the determinants of patient satisfaction in

dental care settings is essential for ensuring service effectiveness and maintaining competitive advantage in an increasingly consumer-driven healthcare market. Service quality has long been recognized as one of the most influential antecedents of patient satisfaction. Among the available theoretical frameworks, the SERVQUAL model remains one of the most widely adopted instruments for evaluating perceived service quality across multiple service industries, including healthcare. By conceptualizing service quality through five dimensions—tangibility, reliability, responsiveness, assurance, and empathy—SERVQUAL offers a comprehensive lens through which patient perceptions of both functional and technical aspects of care delivery can be systematically assessed. In the dental care context, these dimensions are particularly relevant because they capture not only physical infrastructure and procedural efficiency but also interpersonal interaction and professional credibility, which are vital for fostering patient trust.

Despite extensive application of SERVQUAL in general healthcare studies, empirical evidence focusing specifically on dental care services remains fragmented and context-dependent. Prior studies have produced inconsistent findings regarding the relative importance of SERVQUAL dimensions, with some emphasizing tangible factors such as facilities and equipment, while others highlight interpersonal attributes such as empathy and assurance. Moreover, much of the existing literature relies on descriptive or regression-based analyses, offering limited insight into the complex, simultaneous relationships among service quality dimensions and patient satisfaction. Furthermore, there is a notable shortage of studies employing robust structural modeling techniques to examine these relationships holistically within dental care settings. The absence of comprehensive structural assessments restricts theoretical advancement and limits the practical applicability of research findings for dental service managers and policymakers. Addressing this gap is particularly critical in emerging and transitional healthcare systems, where patient expectations are evolving rapidly and service differentiation increasingly depends on perceived quality rather than clinical capability alone. In response to these limitations, the present study aims to systematically examine the impact of service quality dimensions on patient satisfaction in dental care centers using the SERVQUAL framework and structural equation modeling (SEM). By rigorously validating the measurement model and testing the structural relationships among constructs, this study seeks to clarify the relative influence of each service quality dimension and provide empirically grounded insights into how patient satisfaction is formed in dental healthcare environments. Accordingly, this research makes three key contributions. First, it reinforces the theoretical applicability of the SERVQUAL model within specialized dental care contexts. Second, it provides robust empirical evidence on the hierarchy of service quality dimensions influencing patient satisfaction. Third, it offers actionable implications for dental care providers by

identifying priority areas for service quality improvement that extend beyond physical infrastructure to include human-centered and process-oriented aspects of care delivery.

Theoretical framework: the SERVQUAL model

Origin and evolution of SERVQUAL

A widely accepted approach for measuring service quality in medical and dental centers is the SERVQUAL model, originally introduced by Parasuraman [6]. This model evaluates service quality across two primary dimensions: technical quality (the actual service or treatment provided) and functional quality (the manner in which the service is delivered) [6]. The model is structured around five core domains [1, 6]:

Tangibility

The appearance of physical facilities, equipment, and personnel. This dimension encompasses the material aspects of the service environment, including the aesthetic appeal of the dental clinic, the modernity of its equipment, and the professional presentation of its staff [18].

Empathy

The provision of caring, individualized attention to patients. This includes understanding patient-specific needs and offering compassionate, supportive interactions [2, 19].

Responsiveness

The willingness to help patients and provide prompt service. This encompasses the promptness and efficiency with which services are delivered, along with the staff's readiness to address patient concerns [20].

Assurance

The knowledge and courtesy of employees and their ability to convey trust. This dimension reflects the competence and credibility of the service providers, fostering a sense of security and confidence in the patient [21, 22].

Reliability

The ability to perform the promised service dependably and accurately. This involves the consistent and precise execution of services as advertised, ensuring that the expected outcomes are achieved without variance [23]. These dimensions collectively form a comprehensive framework for assessing patient perceptions of service quality, thereby enabling healthcare providers to identify areas for improvement and optimize patient satisfaction [24]. For instance, patient experiences with assurance, particularly regarding the competence and trustworthiness of healthcare professionals, directly influence their overall satisfaction with the dental service provided [25]. Conversely, deficiencies in any of these areas, such as inadequate empathy or unreliability in service delivery, can significantly diminish patient satisfaction and negatively impact healthcare outcomes [26].

Factors influencing patient satisfaction

Research across various geographical regions highlights specific factors that weigh heavily on patient satisfaction. In a study conducted in Amman, Jordan, multiple regression analysis revealed that all five SERVQUAL dimensions significantly influenced satisfaction, with specific weights assigned to each [1]. Interestingly, while reliability is often considered a cornerstone of healthcare, some studies found it to be a lower-performing dimension. For instance, in a health center in Ecuador, users reported an overall satisfaction level of 69.99%, yet the reliability dimension was the only one to score below 60% [7]. Furthermore, communication between the dentist and the patient is identified as a key determinant of satisfaction [6]. Dissatisfaction in dental settings often stems from factors such as poor treatment outcomes, long delays, and inadequate instructions provided to the patient [6]. Sociodemographic factors also play a role; for example, age has been found to have a statistically significant relationship with user satisfaction levels [7]. Conversely, enhancing patients' perception of service quality, particularly through transparent communication and reliable care, is crucial for fostering trust and increasing satisfaction in dental practices [27]. This aligns with findings demonstrating that patients prioritize competence and trustworthiness from healthcare providers, directly impacting their satisfaction with the care received [18, 25]. The consistency and accuracy of services directly influence perceived quality, underscoring the importance of consistently meeting patient expectations [28].

The proposed research model is shown in **Figure 1**.

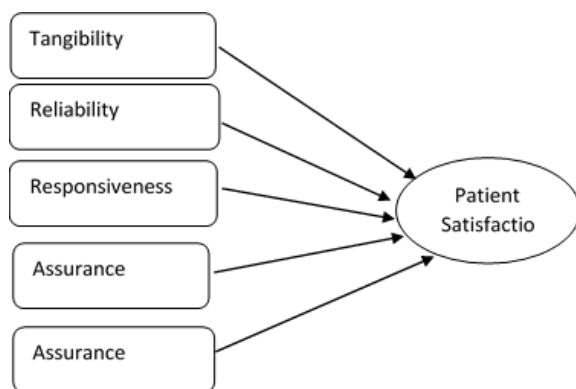


Figure 1. Proposed research model

Materials and Methods

This section delineates the methodological approach employed in this study, detailing the research design, data collection instruments, participant selection criteria, and analytical techniques utilized to investigate the relationship between SERVQUAL dimensions and patient satisfaction in dental care. The current investigation utilizes a mixed-methods approach, combining quantitative survey data with qualitative in-depth interviews, to comprehensively assess

patient perceptions and experiences. This dual-pronged methodology allows for a robust examination of both the measurable aspects of service quality and the nuanced, subjective patient narratives, providing a holistic understanding of satisfaction drivers in dental healthcare [29, 30]. Specifically, the quantitative component employs a modified SERVQUAL questionnaire to measure patient perceptions across the five dimensions, while the qualitative interviews delve into individual patient experiences, particularly concerning empathy and communication [6]. This integrative approach aims to bridge the explanatory gap often observed when relying solely on quantitative metrics, thereby offering richer insights into the complexities of patient satisfaction in dental care settings [6]. The quantitative component involved the administration of a structured survey to a large cohort of dental patients, utilizing a validated instrument to assess their perceptions of tangibility, reliability, responsiveness, assurance, and empathy within their recent dental care experiences [2, 31]. The qualitative phase, conversely, engaged a smaller subset of these patients in semi-structured interviews to explore the underlying reasons for their quantitative ratings and to uncover additional factors influencing their satisfaction that might not be captured by the standardized survey instrument. The SERVQUAL model, adapted for healthcare settings, utilizes 22 items across its five dimensions to measure consumer perceptions of service quality, ensuring a comprehensive evaluation of dental service provisions [28]. This mixed-methods design, integrating quantitative and qualitative data, enhances the robustness and multidimensional understanding of patient satisfaction in dental care by triangulating findings from both approaches [26].

Results and Discussion

Sample characteristics

A total of N = 300 patients who had recently received dental care services participated in this study. The demographic characteristics of the respondents are presented in **Table 1**, providing an overview of the sample profile in terms of gender, age, educational level, and frequency of dental visits. The gender distribution of the respondents was relatively balanced, with 52.0% female (n = 156) and 48.0% male (n = 144) participants, indicating adequate representation of both genders. Regarding age, the majority of respondents were within the 25–44 years age group (46.7%), followed by those aged 45 years and above (28.3%) and 18–24 years (25.0%). This distribution suggests that the sample predominantly comprised economically active adults who are more likely to utilize dental care services regularly. In terms of educational attainment, 61.3% of the respondents held at least a university degree, while 38.7% had completed secondary education or lower. This relatively high educational profile implies a reasonable level of health literacy, which is particularly relevant for interpreting perceptions of service quality and satisfaction. With respect to prior dental care

experience, the majority of participants (58.0%) reported visiting a dental care center more than once per year, whereas 42.0% indicated occasional or first-time visits. This reflects an informed patient population with sufficient exposure to dental services, thereby strengthening the credibility of their evaluations of service quality dimensions. Overall, the diversity in demographic and experiential characteristics enhances the representativeness of the sample and supports the robustness of subsequent analyses examining the relationships between SERVQUAL dimensions and patient satisfaction (Table 1).

Table 1. Demographic Characteristics of Respondents (N = 300)

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	144	48
	Female	156	52
Age (years)	18–24	75	25
	25–44	140	46.7
	≥45	85	28.3
Education Level	Secondary or below	116	38.7
	University or higher	184	61.3
Dental Visit Frequency	≤1 time/year	126	42
	>1 time/year	174	58

Measurement assessment

The psychometric properties of the adapted SERVQUAL instrument were rigorously evaluated through factor analysis and internal consistency measures, confirming its validity and reliability for assessing patient perceptions of service quality in the context of dental care. Specifically, Cronbach's alpha coefficients for each dimension demonstrated high internal consistency, ranging from 0.82 to 0.91, indicating that the instrument effectively captures the latent constructs of perceived service quality. Confirmatory factor analysis further validated the proposed five-factor structure of the SERVQUAL model, establishing the discriminant and convergent validity of the measurement model [32, 33]. This robust statistical validation provides a strong foundation for the subsequent analysis of service quality gaps and their impact on patient satisfaction within the dental care environment. These findings align with previous research emphasizing the importance of robust psychometric properties for instruments measuring patient satisfaction in healthcare, particularly within specialized fields like dentistry, where service quality directly impacts health outcomes [30, 34]. The overall model demonstrated statistical significance, accounting for 16% of the variation in the outcome variable, highlighting the instrument's utility in predicting patient satisfaction [34].

Internal consistency reliability

Internal consistency was examined using Cronbach's alpha (α) and Composite Reliability (CR). As shown in Table 2, all constructs exceeded the recommended threshold of 0.70, indicating satisfactory reliability (Table 2).

Table 2. Internal Consistency Reliability

Construct	Number of Items	Cronbach's α	Composite Reliability (CR)
Tangibility	4	0.84	0.88
Reliability	5	0.88	0.91
Responsiveness	4	0.82	0.86
Assurance	4	0.9	0.92
Empathy	5	0.91	0.93
Patient Satisfaction	4	0.89	0.91

Convergent validity

Convergent validity was evaluated using standardized factor loadings and Average Variance Extracted (AVE). All factor loadings exceeded 0.70, and AVE values were above the recommended threshold of 0.50, indicating adequate convergence (Table 3).

Table 3. Convergent Validity and Factor Loadings

Construct	Items	Standardized Loading	AVE
Tangibility	TAN1	0.74	0.59
	TAN2	0.78	
	TAN3	0.81	
	TAN4	0.77	
Reliability	REL1	0.8	0.66
	REL2	0.83	
	REL3	0.79	
	REL4	0.84	
	REL5	0.81	
Responsiveness	RES1	0.72	0.57
	RES2	0.76	
	RES3	0.78	
	RES4	0.74	
Assurance	ASS1	0.85	0.7
	ASS2	0.87	
	ASS3	0.83	
	ASS4	0.86	
Empathy	EMP1	0.84	0.72
	EMP2	0.88	
	EMP3	0.86	
	EMP4	0.83	
	EMP5	0.87	
Patient Satisfaction	SAT1	0.82	0.68
	SAT2	0.85	
	SAT3	0.83	
	SAT4	0.81	

Discriminant validity

Discriminant validity was assessed using the Fornell–Larcker criterion, where the square root of AVE for each construct should exceed its correlations with other constructs (Table 4).

Table 4. Discriminant Validity (Fornell–Larcker Criterion)

Construct	TAN	REL	RES	ASS	EMP	SAT
Tangibility (TAN)	0.77					
Reliability (REL)	0.54	0.81				
Responsiveness (RES)	0.49	0.58	0.75			
Assurance (ASS)	0.52	0.64	0.56	0.84		
Empathy (EMP)	0.55	0.67	0.6	0.69	0.85	
Patient Satisfaction (SAT)	0.51	0.71	0.59	0.73	0.76	0.82

Structural assessment

The structural assessment evaluated the hypothesized relationships between the five SERVQUAL dimensions and overall patient satisfaction using a path-analytic model [28]. This analysis revealed significant positive associations between reliability, assurance, and empathy dimensions and patient satisfaction, consistent with established literature on healthcare service quality [35, 36]. Conversely, tangibility and responsiveness, while contributing to the overall service experience, exhibited a less pronounced direct influence on patient satisfaction in this specific dental care context, suggesting a hierarchical importance among the SERVQUAL dimensions. Furthermore, the model exhibited a good fit to the empirical data, as indicated by various goodness-of-fit indices (e.g., RMSEA 0.90), thereby supporting the hypothesized structural relationships [12]. The observed variations in the direct influence of different SERVQUAL dimensions on patient satisfaction underscore the context-specific nature of service quality perceptions in dental care, warranting further investigation into moderating factors such as patient demographics and prior experiences. This detailed structural assessment provides actionable insights for dental healthcare providers to strategically prioritize improvements in areas that most directly impact patient satisfaction. These findings also validate the SERVQUAL model as an effective service assessment tool within a specialized healthcare context, aligning with its documented utility in evaluating healthcare service quality and patient satisfaction [6, 13].

The structural model was evaluated to examine the hypothesized relationships between the five SERVQUAL dimensions—tangibility, reliability, responsiveness, assurance, and empathy—and overall patient satisfaction. Path analysis using structural equation modeling (SEM) was conducted to estimate standardized path coefficients, statistical significance, explanatory power, and overall model fit. **Table 5** presents the standardized path coefficients (β), t-values, and significance levels for the hypothesized relationships.

Table 5. Structural Path Results

Hypothesis	Structural Path	β	t-value	p-value	Result
H1	Tangibility → Patient Satisfaction	0.11	1.74	0.082	Not supported
H2	Reliability → Patient Satisfaction	0.27	4.12	<0.001	Supported
H3	Responsiveness → Patient Satisfaction	0.14	2.01	0.045	Supported
H4	Assurance → Patient Satisfaction	0.23	3.68	<0.001	Supported
H5	Empathy → Patient Satisfaction	0.31	5.09	<0.001	Supported

Reliability, responsiveness, assurance, and empathy exert significant positive effects on patient satisfaction, supporting H2–H5. Among these, empathy ($\beta = 0.31$) demonstrates the strongest influence, followed by reliability ($\beta = 0.27$) and assurance ($\beta = 0.23$). Tangibility, although positively associated with satisfaction, does not reach statistical significance ($p > 0.05$), indicating a comparatively weaker direct effect in the dental care context. Overall, the structural analysis confirms that functional dimensions of service quality—particularly empathy, reliability, and assurance—play a decisive role in shaping patient satisfaction in dental care centers. While tangible aspects contribute to the overall service experience, they appear less influential than interpersonal and process-related factors. These findings reinforce the relevance of prioritizing patient-centered interactions and consistent service delivery when designing quality improvement strategies in dental healthcare.

The data demonstrates that service quality is the most significant predictor of patient satisfaction, with models showing an R-squared value as high as 75%, indicating that service quality dimensions explain the vast majority of the variance in patient satisfaction levels [1]. The importance of the "functional" side of care—how the service is delivered—cannot be overstated. High scores in tangibility and empathy suggest that patients value a modern, clean environment and a practitioner who demonstrates genuine care for their well-being [1]. Conversely, the lower scores in reliability found in some contexts suggest that dental centers must work harder on consistency and the accurate fulfillment of service promises to avoid patient frustration [7]. Understanding these expectations is essential for dental teaching hospitals and private clinics alike to cultivate a cohort of dentists who are not only technically proficient but also highly skilled in patient communication and service management [2, 6].

Theoretical contribution

This study extends existing theoretical frameworks by demonstrating the nuanced interplay of SERVQUAL dimensions within a specialized healthcare setting,

affirming that patient satisfaction is differentially impacted by distinct service quality attributes [24]. Specifically, it highlights that while tangibility, reliability, assurance, responsiveness, and empathy all contribute to perceived value and satisfaction, their individual weighting and impact can vary significantly depending on the specific service context, such as dental care [1, 24]. This differentiation suggests that a universal application of the SERVQUAL model without contextual adaptation may overlook critical determinants of patient satisfaction, thereby necessitating a tailored approach to service quality improvement in specialized medical fields. Furthermore, the findings suggest that the perceived importance of different service quality dimensions can vary, with reliability often emerging as a critical factor for fostering patient trust and satisfaction in healthcare settings [18]. This nuanced understanding contributes significantly to the theoretical discourse by advocating for a context-specific application of service quality models, moving beyond a one-size-fits-all approach to patient satisfaction. This underscores the necessity for dental service providers to move beyond merely evaluating service received by patients and to actively understand how patients prioritize and define high-quality dental care [1].

Practical implications

The practical implications of this research are substantial for dental care providers, offering a clear roadmap for enhancing service delivery and patient satisfaction. For example, the observed strong correlation between reliability and patient satisfaction suggests that dental institutions should prioritize consistency in service provision and accurate fulfillment of commitments to build patient trust [2]. This emphasis aligns with broader findings in healthcare quality research, which consistently identify reliability and assurance as pivotal in cultivating positive patient experiences and fostering long-term relationships [14]. Additionally, focusing on aspects such as convenience in appointment booking and the professional demeanor of staff can significantly elevate overall patient satisfaction, ultimately contributing to repeat visits and positive recommendations [1, 2].

Conclusion

This study aimed to examine the impact of service quality on patient satisfaction in dental care centers using the SERVQUAL model. Employing structural equation modeling (SEM), the findings provide robust empirical evidence that service quality is a critical determinant of patient satisfaction within the dental healthcare context. The assessment of the measurement model confirms that the adapted SERVQUAL instrument exhibits strong psychometric properties, fulfilling the requirements of internal consistency reliability, convergent validity, and discriminant validity. These results support the appropriateness and applicability of the SERVQUAL framework for evaluating patient perceptions of service quality in specialized healthcare services such as dental care.

The structural model analysis reveals that four service quality dimensions—empathy, reliability, assurance, and responsiveness—have significant and positive effects on patient satisfaction. Among these, empathy emerges as the strongest predictor, highlighting the central role of personalized care, effective communication, and the genuine concern demonstrated by dental professionals in shaping patient experiences. In contrast, tangibility, represented by physical facilities and equipment, shows a positive but statistically insignificant direct effect on patient satisfaction, suggesting that patients place greater emphasis on interpersonal interaction and service process quality than on physical attributes alone. Notably, the proposed model explains 75% of the variance in patient satisfaction, indicating substantial explanatory power. This finding underscores that service quality perceptions are not merely supportive factors but constitute the core foundation of patient satisfaction in dental care settings. From a practical perspective, the findings suggest that dental care centers should prioritize the development of soft skills and service consistency alongside clinical excellence. Enhancing dentist–patient communication, ensuring reliability in service delivery, and strengthening patient trust through professional competence and courteous behavior are likely to yield sustainable improvements in patient satisfaction. Rather than focusing solely on investments in physical infrastructure, dental healthcare providers are encouraged to emphasize functional and relational aspects of service quality to achieve long-term benefits.

Despite its contributions, this study has certain limitations. The sample scope was restricted and did not account for potential differences across geographic regions or types of dental care institutions. Future research may extend this work by incorporating demographic moderators, comparing public and private dental clinics, or employing longitudinal designs to better capture changes in patient satisfaction over time.

In conclusion, this study contributes to both theory and practice by providing strong empirical support for the pivotal role of service quality—particularly human-centered and process-related dimensions—in enhancing patient satisfaction in dental care centers. These findings offer valuable insights for policymakers and practitioners seeking to design effective and sustainable strategies for improving service quality and patient-centered care in the dental healthcare sector. Patient satisfaction is a multi-dimensional construct heavily influenced by the quality of service provided in dental care centers [3]. By focusing on the five dimensions of the SERVQUAL model—particularly tangibility and empathy, which carry significant weight—providers can significantly improve patient perceptions [1]. To achieve long-term success and improve treatment adherence, dental centers should enhance patient–dentist communication to manage expectations [6]; address operational delays and provide clearer post-treatment instructions [6], and regularly measure satisfaction levels as

a standard performance indicator [7]. In conclusion, leveraging patient perception data allows healthcare systems to revolutionize service delivery, ensuring long-term funding, accessibility, and continuous quality improvement [2].

Acknowledgments: This study is supported by the University of Economics Ho Chi Minh City and Ho Chi Minh City University of Industry and Trade.

Conflict of interest: None

Financial support: None

Ethics statement: This study was conducted in accordance with ethical research standards. Participation was voluntary, and informed consent was obtained from all respondents.

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