



Identifying Key Drivers of Patient's Satisfaction in Indian Leading Hospitals using Online Reviews

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ABSTRACT

Patient satisfaction has become a critical benchmark for evaluating healthcare quality, influencing hospital reputation, patient retention, and long-term sustainability. In India, where healthcare delivery faces challenges of scale, resource disparities, and rising digital adoption, online reviews offer a valuable lens into authentic patient experiences. This study investigates the key drivers of patient satisfaction in leading Indian hospitals by analyzing 6,548 Google Maps reviews using text mining, co-occurrence analysis, and sentiment analysis. Frequency analysis revealed that terms such as *doctor*, *treatment*, *patient*, *staff*, and *hospital* dominate patient narratives, underscoring the centrality of clinical care and interpersonal interactions. Co-occurrence networks highlighted associations between medical processes, staff behavior, costs, and emotional dimensions of care, while sentiment analysis showed that 62% of reviews expressed positive experiences, particularly regarding treatment quality and staff responsiveness, whereas 38% reflected dissatisfaction linked to waiting times, administrative inefficiencies, and hospital management. By leveraging large-scale, user-generated data, this research addresses limitations of traditional survey-based approaches and demonstrates the utility of digital platforms in capturing real-time patient perceptions. The findings provide actionable insights for healthcare providers and policymakers to enhance service quality, strengthen patient-centered care, and improve overall satisfaction in India's rapidly evolving healthcare sector.

1. Introduction

Healthcare systems across the world are increasingly recognizing patient satisfaction as a central indicator of healthcare quality, service effectiveness, and overall system performance, with many countries integrating patient experience metrics into national healthcare evaluation frameworks (OECD, 2023). At the global level, the World Health Organization approved a base programme budget of US\$ 4.2 billion for 2026–2027, accompanied by a 20% increase in assessed contributions, reflecting enhanced international commitment toward sustainable health financing and improved healthcare delivery (World Health Organization, 2025). In parallel, patient satisfaction has emerged as a standardized outcome measure, with studies indicating that around 70–80% of patients in developed healthcare systems report moderate to high satisfaction levels, although significant variations persist depending on accessibility, responsiveness, and quality of care (OECD, 2023). The digital transformation of

healthcare has further reshaped patient behavior, as over 60% of patients globally rely on online reviews and ratings before selecting healthcare providers, demonstrating the growing importance of user-generated content in influencing healthcare decisions (Simon et al., 2025). In India, healthcare is a rapidly growing sector projected to reach US \$638 billion by 2025, with increasing digital adoption further transforming healthcare delivery and patient engagement (India Brand Equity Foundation, 2025). India's healthcare system serves a population of over 1.4 billion people, making it one of the largest and most complex healthcare markets globally, with significant challenges in ensuring equitable access and consistent quality across regions (World Bank Group, 2026). Empirical studies conducted in Indian hospitals report patient satisfaction levels ranging between 60% and 85%, reflecting disparities in infrastructure, service quality, waiting time, and cost of treatment between public and private healthcare institutions (Swain, 2019). Additionally, India has witnessed a rapid increase in digital adoption, with over 1 billion internet

users, which has significantly amplified the role of online platforms in shaping patient perceptions and hospital choice (Telecom Regulatory Authority of India, 2026).

Patient satisfaction is widely acknowledged as a critical outcome of healthcare delivery, reflecting patients' overall evaluation of their experiences with healthcare services, including medical treatment, interpersonal interactions, and organizational efficiency (Donabedian, 1988). It serves as a key performance indicator for healthcare organizations, influencing patient retention, hospital reputation, and long-term sustainability in an increasingly competitive healthcare environment (Andaleeb, 2001). In recent years, the healthcare sector has undergone a paradigm shift from provider-centered care to patient-centered care, in which patient perceptions, expectations, and experiences are given greater weight in evaluating service quality (Berwick, 2009). In India, the coexistence of public and private healthcare systems has intensified competition among hospitals, compelling them to focus on improving patient satisfaction to achieve a competitive advantage (Balarajan et al., 2011). At the same time, government initiatives such as quality accreditation programs and healthcare reforms have emphasized the need to systematically measure and improve patient satisfaction as part of broader quality assurance frameworks (Government of India, 2026). The emergence of digital health platforms has further transformed the healthcare landscape, enabling patients to share their experiences through online reviews, ratings, and feedback systems, thereby creating a new dimension of healthcare evaluation (Stoumpos et al., 2023).

Existing literature identifies patient satisfaction as a multidimensional construct influenced by various factors, including service quality, communication, waiting time, infrastructure, and staff behavior (Parasuraman et al., 1998). The SERVQUAL model has been widely applied in healthcare research, highlighting dimensions such as reliability, responsiveness, assurance, empathy, and tangibles as key determinants of patient satisfaction (Lee & Kim, 2017). Empirical studies in the Indian healthcare context have found that doctor-patient communication and interpersonal care are among the most significant predictors of patient satisfaction (Andaleeb, 2001). Research also indicates that operational factors such as waiting time, administrative efficiency, and ease of access significantly influence patient perceptions and overall satisfaction levels (Duggirala et al., 2008). Furthermore, the cost of treatment and perceived value for money have been identified as critical determinants, particularly in developing countries, where healthcare affordability remains a major concern (Das & Guha, 2024). Recent studies have begun to explore the role of digital platforms in healthcare evaluation, suggesting that online reviews provide rich, real-time insights into patient experiences and satisfaction drivers (Stoumpos et al., 2023). However, the majority of existing studies rely on traditional survey-based methods, which may be limited by response bias, small sample sizes, and a lack of

real-time data (Hussain et al., 2026). This highlights a significant research gap in leveraging large-scale online review data to identify key drivers of patient satisfaction, particularly in the context of Indian hospitals.

Previous studies on patient satisfaction have predominantly relied on traditional survey-based methods, which are often limited by small sample sizes, response bias, and lack of real-time insights into patient experiences (Batbaatar et al., 2015). Additionally, although several studies have identified key determinants of patient satisfaction such as service quality, communication, and waiting time, limited research has utilized large-scale online review data to capture authentic patient perceptions, particularly in the context of Indian hospitals (Akhtar et al., 2023). Therefore, the primary purpose of this study is to identify the key drivers of patient satisfaction in leading Indian hospitals using online reviews as a data source. The study aims to analyze patient-generated content to uncover critical factors influencing satisfaction, including service quality, communication, infrastructure, waiting time, and cost.

Furthermore, this research seeks to apply data-driven techniques such as sentiment analysis and co-occurrence analysis to extract meaningful insights from large volumes of online reviews. By addressing the limitations of prior research and leveraging digital data sources, this study contributes to the growing field of healthcare analytics and provides practical implications for improving patient experience and service quality in Indian hospitals.

2. Literature Review

2.1. Patient Satisfaction in Healthcare

As competition in the healthcare sector intensifies, both practitioners and researchers are increasingly focusing on understanding patients' perceptions of service quality, as these perceptions play a critical role in shaping satisfaction levels and influencing subsequent behavioral intentions (Murti et al., 2013). Patient satisfaction is widely recognized as a key indicator of healthcare quality and is closely associated with improved clinical outcomes and patient retention (Kaur et al., 2022).

Existing studies suggest that both patients and healthcare providers place significant importance on the availability of accessible clinical services, along with a healthcare environment that is safe, clean, comfortable, and conducive to effective care delivery (Lee & Kim, 2017). At the same time, healthcare organizations face the dual challenge of controlling costs while maintaining high service quality standards (Barkur et al., 2023).

Furthermore, patient satisfaction is inherently multidimensional and subjective, influenced by a wide range of factors including the quality of clinical care, hospital infrastructure, cleanliness, availability of medicines, cost of services, and the behavior and responsiveness of healthcare professionals (Kaur et al., 2022). These dimensions collectively

shape patients' overall healthcare experiences and perceptions of service quality

2.2. Service Quality Models in Healthcare

The integration of service quality concepts into the healthcare sector has attracted considerable attention; however, evaluating patients' expectations and perceptions of healthcare delivery remains a complex task (Lu et al., 2020). Unlike other service industries, healthcare involves both technical and functional dimensions, making the assessment of service quality inherently more challenging.

One of the most widely used frameworks for measuring service quality is the SERVQUAL model, which evaluates the gap between customer expectations and perceived service performance across five dimensions: tangibles, reliability, responsiveness, assurance, and empathy (Parasuraman et al., 1988). In the context of healthcare, these dimensions reflect core elements such as hospital infrastructure and environment, accuracy and consistency of medical services, timeliness of care delivery, professional competence, and individualized patient attention. Collectively, these dimensions provide a foundational framework for assessing service quality in healthcare settings (Liu et al., 2025). Given its widespread applicability, the SERVQUAL model has been extensively used to assess service quality in healthcare settings, building on this foundation, researchers have developed healthcare-specific models to better capture the unique characteristics of healthcare delivery and provide a more comprehensive evaluation of service quality (Lee & Kim, 2017).

2.3. Patient Satisfaction in Indian Hospitals

Patient satisfaction has emerged as a critical indicator of healthcare quality in India, reflecting the effectiveness and patient-centeredness of services, while ongoing challenges such as high patient volumes, limited resources, and disparities in access continue to shape patient experiences and satisfaction levels despite recent transformations in the healthcare system (Koul et al., 2024). Empirical studies in Indian hospital settings show that patient satisfaction is influenced by factors such as resource availability, quality of care, communication, and infrastructure, with evidence from public hospitals indicating that issues like medicine shortages, long waiting times, and short consultations drive dissatisfaction, whereas courteous staff behavior and cleanliness enhance satisfaction (Gupta et al., 2012). Similarly, studies in secondary and tertiary care hospitals in India show that patient satisfaction is closely linked to factors such as doctor-patient communication, staff responsiveness, and quality of care, with patient feedback playing a vital role in enhancing service quality and aligning healthcare delivery with patient expectations (Kaur et al., 2022). Recent studies in Indian hospital settings indicate that patient satisfaction is influenced by both clinical and non-clinical factors, including access to healthcare services, administrative processes,

staff behavior, and overall care experience, which collectively shape patients' perceptions of service quality (Srivastava et al., 2025; Gupta et al., 2012).

2.4. Big Data and Online Reviews in Patient Satisfaction Healthcare

Text mining has increasingly been utilized as an effective technique for analyzing qualitative data, including interviews, online reviews, and open-ended survey responses. Within healthcare contexts, it allows researchers to explore how patients linguistically construct and interpret concepts such as trust, risk, and usefulness, which are closely associated with key psychological constructs (Ho et al., 2025.). The increasing adoption of digital platforms has significantly transformed how patients evaluate and share their healthcare experiences, with online review platforms, such as hospital rating websites and healthcare applications emerging as important sources of information that enable patients to express their opinions regarding service quality and overall satisfaction (Emmert et al., 2013). Research to date indicates that these platforms have gained growing popularity, reflected in rising numbers of user ratings, higher traffic rankings, and increased public awareness, while other studies have focused on examining the content and characteristics of narrative comments or analyzing patient satisfaction surveys (Emmert et al., 2016). Unlike structured instruments such as SERVQUAL, online reviews provide rich, unstructured patient feedback that offers deeper insights into patient perceptions and service quality dimensions (Dhakate & Joshi, 2023).

2.5. Sentiment Analysis of Online Reviews

Sentiment analysis, also referred to as opinion mining, is a computational method used to identify, classify, and interpret subjective information within textual data. With the rapid growth of user-generated content on digital platforms such as hospital rating websites, Google Reviews, and healthcare applications, sentiment analysis has become an important tool for understanding patient perceptions, satisfaction levels, and emotional responses (Emmert et al., 2013). This approach typically utilizes natural language processing (NLP) and machine learning techniques to determine the polarity (positive or negative) and intensity of sentiments expressed in online reviews. In addition, various analytical tools and software enable the automatic computation of sentiment scores based on textual data (Jongeling et al., 2015). In the context of healthcare, sentiment analysis provides valuable insights into patient experiences by identifying key factors that drive satisfaction and dissatisfaction, with positive sentiments typically associated with aspects such as quality of medical care, effective communication, empathy of healthcare professionals, cleanliness, and hospital infrastructure, while negative sentiments often highlight issues such as long waiting times, high costs, lack of responsiveness, and administrative inefficiencies (Dhakate & Joshi, 2023).

Furthermore, online review data has been increasingly used to support quantitative analysis of patient perceptions, enabling more comprehensive insights into healthcare quality and decision-making (Gao et al., 2015).

Despite the growing body of literature on patient satisfaction and service quality in healthcare, most existing studies rely on a structured survey-based approach such as SERVQUAL (Parasuraman et al., 1988). This method, while valuable, often fail to capture real-time and unstructured patient experiences. Furthermore, limited research has explored the use of online patient reviews to identify key drivers of satisfaction, particularly in the context of Indian hospitals. Therefore, this study seeks to address this gap by utilizing online review data to provide deeper insights into patient satisfaction in leading hospitals in India.

3. Methodology

This study adopts a qualitative method to investigate the current condition of the healthcare services in India. In order to gather the patients' opinions and investigate the correlation between the patients' experience and satisfaction with India's top 5 leading hospitals through the patients' online reviews, the research design was formulated and represented in Figure 1. The study comprises the two primary sections. The first is the collection of data, and the second is the involvement of qualitative analysis, like frequency of words, co-occurrence, cluster, and sentiment analysis done among the words and between the words.

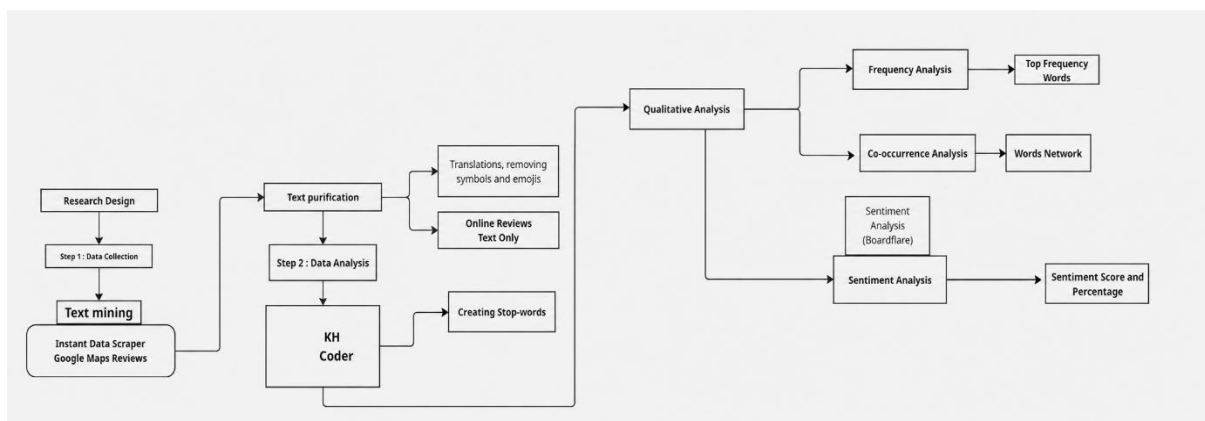


Figure 1. Research flow.

3.1. Data Collection

The study focused on five leading hospitals in India: All India Institute of Medical Sciences (AIIMS), Postgraduate Institute of Medical Education and Research (PGIMER), Christian Medical College (CMC) Vellore, Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER), and Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGIMS). These hospitals were selected based on the National Institutional Ranking Framework (NIRF) 2025 Medical Rankings published by the Ministry of Education, Government of India. According to the NIRF 2025 rankings, these institutions were ranked among the top five medical institutions in India and are widely recognized for their excellence in healthcare delivery, medical education, research, and specialized clinical services. Therefore, they were considered appropriate representatives of leading hospitals for examining patient satisfaction through online reviews.

This research investigates the qualitative dimensions of patients' experience at top 5 leading hospitals through the systematic analysis of online reviews obtained from Google Maps. Google Maps was chosen because, unlike platforms such as TripAdvisor or Booking.com that

mainly capture tourism pre-trip planning or accommodation feedback, it provides a larger set of location-verified, post-visit reviews that offer authentic and diverse insights into actual visitor experiences of every places. Adopting the SERVQUAL model approach enables an inductive exploration of visitors' narratives to identify emergent themes and interpret underlying behavioral patterns. This method allows the study to move beyond surface-level data, uncovering the nuanced perceptions, motivations, and experiential satisfaction expressed by patients in their own words (Parasuraman et al., 1988). Building on a qualitative analytical framework, this study aims to develop a conceptual model of patient behavior that captures both the affective and cognitive dimensions of healthcare service experiences. In line with the service quality perspective proposed by (Parasuraman et al., 1988), the affective dimension reflects patients' emotional responses, satisfaction levels, and perceived comfort during their interactions with hospital services, while the cognitive dimension encompasses their evaluations, beliefs, and perceptions regarding service quality, treatment effectiveness, and institutional performance.

By integrating these two dimensions, the study provides a comprehensive understanding of how patients form overall judgments about hospital services, thereby

offering valuable insights into the determinants of patient satisfaction and perceived service quality.

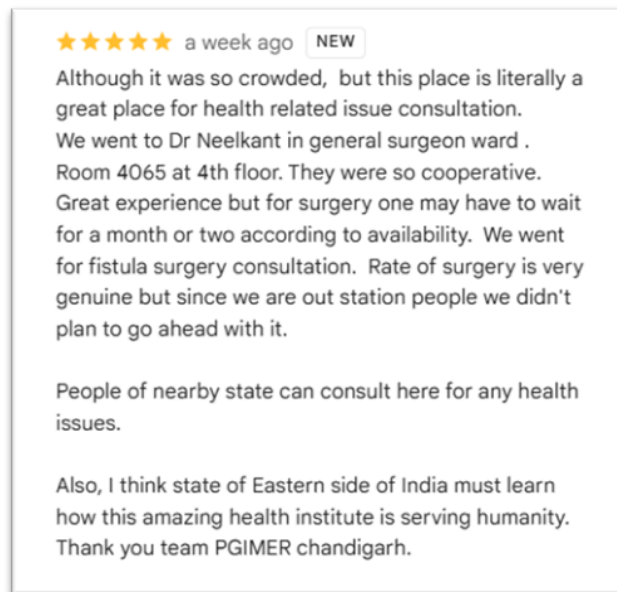


Figure 2. Online review visualization.

As shown in figure2, the textual portion of the reviews will be used to examine patients' satisfaction levels in this study. In accordance with South Korean laws and institutional regulations, this study did not necessitate formal ethical or legal approval. All research procedures were designed and implemented in full compliance with data protection, confidentiality, and copyright standards to uphold the integrity and ethical rigor of the study. The analysis was conducted exclusively on publicly available data, ensuring that no personally identifiable information was collected, disclosed, or utilized. Accordingly, the study conforms to all relevant legal and ethical requirements governing research of this nature.

3.2. Data Analysis

Qualitative textual analysis was carried out using KH Coder 3 after data collection, leveraging its capabilities for content analysis and interpretation of textual information. The software assists in the systematic interpretation of qualitative data by applying linguistic processing techniques and generating visual representations that reveal relationships among frequently used terms but the filtering out the irrelevant or insignificant words need to be done so that they don't interfere with the result. The processed data underwent analysis using KH Coder 3 software, starting with the initial scrutiny of the top 100 most frequently used words. Afterwards the co-occurrence network analysis of these 100

words was done to see the close relationship among them. Then the sentiment analysis is done using the text review in excel with the excel extension for sentiment analysis named BoardFlare which shows the positive and negative sentiments which further tells the satisfaction level of the patients visited these top 5 hospitals. Further the visualization is done with the help of the KH Coder 3 software.

4. Results

4.1. Frequency Analysis

The cleaned dataset consists of 6,548 hospital reviews, which were collected using the Google Instant Data Scraper. The data were subsequently processed and structured to create a reliable foundation for analyzing hospital service-related factors. To identify key themes relevant to the research, a frequency analysis was conducted, and keywords closely associated with the study topic were extracted. Table 1 presents the ranking and frequency of the top 100 most frequently occurring words, encompassing a broad range of topics related to consumer behavior toward hospital services. The most frequently occurring terms include "doctor," "treatment," "patient," "staff," "hospital," "people," "place," "service," "experience," and "facility," highlighting the primary aspects influencing patient perceptions and service evaluation.

Table 1. Frequency table

Rank	Words	Freq	Rank	Words	Freq	Rank	Words	Freq	Rank	Words	Freq
1	doctor	1554	26	emergency	120	51	surgery	67	76	member	44
2	treatment	1291	27	appointment	116	52	work	66	77	star	43
3	patient	1093	28	world	116	53	name	64	78	security	42
4	staff	759	29	crowd	113	54	date	60	79	waste	42
5	hospital	756	30	life	108	55	rush	60	80	doubt	41
6	people	444	31	country	101	56	express	59	81	price	41
7	place	410	32	patience	97	57	father	59	82	diagnosis	40
8	service	405	33	fare	95	58	type	59	83	language	40
9	experience	282	34	process	95	59	one	58	84	room	40
10	facility	277	35	guard	91	60	person	58	85	help	39
11	care	228	36	government	87	61	queue	56	86	infrastructure	39
12	day	228	37	month	84	62	report	56	87	bed	38
13	time	221	38	cmc	82	63	team	56	88	god	38
14	test	209	39	way	81	64	behavior	55	89	hope	37
15	management	208	40	hour	78	65	kind	54	90	eye	36
16	money	191	41	thanks	78	66	medicine	54	91	support	35
17	lot	187	42	year	78	67	number	52	92	cancer	34
18	department	182	43	disease	76	68	student	52	93	counter	34
19	college	164	44	research	73	69	need	50	94	fee	34
20	problem	151	45	thing	72	70	campus	49	95	issue	34
21	health	139	46	everyone	71	71	today	49	96	anyone	33
22	nurse	137	47	vellore	70	72	area	48	97	institution	33
23	class	136	48	case	69	73	quality	48	98	mother	33
24	cost	130	49	institute	69	74	level	46	99	sister	33
25	system	123	50	state	67	75	ward	46	100	week	33

4.2. Co-occurrence and Sentiment Analysis

Figure 3 illustrates a co-occurrence network visualization that captures the relationships among the most frequently occurring terms within the review dataset of the top 5 hospitals of India (AIIMS, PGIMER, CMC, JIPMER, SGP GIMS). The network is organized into nine distinct sub-graphs, each representing clusters of semantically related concepts.

The co-occurrence network that illustrates the relationships between key terms within the healthcare domain. The network shows how various concepts frequently appear together, revealing underlying patterns of association. Central to the network are terms like "patient," "doctor," "treatment," and "hospital," which are tightly connected, indicating that these concepts often appear together in discussions of healthcare. Surrounding them are terms such as "staff," "experience," and "nurse," which further emphasize the importance of healthcare providers and their roles in patient care. The network also highlights the significance of "test,"

"medicine," and "blood," showcasing the diagnostic processes that are fundamental to medical practice. Other prominent terms like "cost," "security," and "payment" highlight the operational and administrative aspects of healthcare, revealing how these logistical elements are intertwined with patient care. Additionally, terms like "mother," "father," "family," and "hope" demonstrate the emotional and familial factors that play a role in healthcare, particularly in the context of patient support and wellbeing. The presence of "research," "quality," and "healthcare" indicates a focus on improving healthcare standards and outcomes through research and quality management. The size of the nodes in the diagram corresponds to the frequency of the terms, with larger nodes representing more commonly occurring words. This co-occurrence analysis provides valuable insights into the most frequently discussed aspects of healthcare, helping to identify the key areas that intersect in patient care, medical practices, and healthcare systems.

focus on operational inefficiencies, particularly long waiting times for diagnostic tests and appointment scheduling, with sentiment scores around 0.96, indicating strongly negative perceptions.

These examples demonstrate how sentiment analysis, as applied in a previous study by (Akhtar et al; 2025), can effectively quantify patient opinions and experiences. Such analytical insights provide valuable, data-driven guidance for identifying service gaps and improving overall performance within the hospital service industry.

5. Discussion and Conclusions

5.1. Discussions

The findings of this study provide strong evidence that patient satisfaction in leading Indian hospitals is predominantly positive, with over 62% of sentiments reflecting favorable experiences. This aligns with prior research suggesting that healthcare satisfaction is largely driven by perceived service quality, effective treatment, and positive interactions with healthcare professionals (Parasuraman et al., 1988; Andaleeb, 2001).

The frequency and co-occurrence analyses reveal that core healthcare elements such as doctor, treatment, patient, and staff form the central structure of patient discourse, indicating that clinical care and human interaction remain the most influential factors in shaping patient perceptions. This supports the SERVQUAL framework, where dimensions such as reliability, responsiveness, and empathy play a crucial role in determining service quality.

At the same time, sentiment analysis highlights those negative perceptions are primarily associated with operational inefficiencies, including long waiting times, appointment delays, overcrowding, and administrative challenges. These findings are consistent with previous studies in the Indian healthcare context, which emphasize the impact of non-clinical factors on patient satisfaction (Duggirala et al., 2008).

Importantly, the integration of large-scale online review data provides deeper, real-time insights into patient experiences, going beyond traditional survey-based approaches. This demonstrates the growing relevance of digital platforms in capturing authentic patient voices and identifying actionable service gaps.

5.2. Managerial Implications

The findings of this study provide several important implications for hospital administrators and healthcare policymakers. First, improving operational efficiency should be a primary focus, particularly by reducing waiting times and streamlining appointment systems through the adoption of digital scheduling and queue management technologies. Second, given the strong influence of staff behavior and doctor-patient interaction on overall satisfaction, hospitals should invest in continuous training programs that enhance

communication skills, empathy, and patient-centered care practices. Furthermore, in alignment with the SERVQUAL framework developed by A. Parasuraman et al. (1988), healthcare institutions should prioritize strengthening key service quality dimensions, including reliability, responsiveness, and assurance, to ensure consistent and high-quality service delivery. Additionally, hospitals can benefit from leveraging digital feedback systems by actively monitoring and analyzing online reviews to identify patient concerns in real time and implement continuous service improvements. Finally, addressing infrastructure and support-related issues, such as parking facilities, pharmacy services, and administrative processes, can significantly enhance the overall patient experience and contribute to higher satisfaction levels.

5.3. Theoretical Implications

This study makes several contributions to the existing literature on healthcare service quality and patient satisfaction. First, it extends the application of the SERVQUAL model into a big data context by integrating unstructured online review data with traditional service quality frameworks, thereby offering a more dynamic and data-driven approach to service evaluation. Second, the study reinforces the multidimensional nature of patient satisfaction by incorporating both affective (emotional) and cognitive (evaluative) dimensions, consistent with the conceptualization proposed by A. Parasuraman et al. (1988). Third, it demonstrates the effectiveness of combining sentiment analysis and co-occurrence network analysis as complementary methodologies for identifying key drivers of patient satisfaction within large-scale textual data. Finally, the study contributes to the growing field of healthcare analytics by highlighting the value of user-generated content as a reliable, scalable, and real-time data source for evaluating service quality and understanding patient experiences.

5.4. Conclusion, Limitations, and Future Research

This study aimed to identify the key drivers of patient satisfaction in leading Indian hospitals using online review data. The findings reveal that patient satisfaction is predominantly influenced by factors such as service quality, treatment effectiveness, staff behavior, and overall care experience. Although the majority of patient sentiments are positive, the results also highlight persistent operational challenges, including long waiting times, appointment delays, and administrative inefficiencies, which remain significant sources of dissatisfaction. By employing data-driven techniques such as frequency analysis, co-occurrence network analysis, and sentiment analysis, this study provides a comprehensive and nuanced understanding of patient perceptions while identifying critical areas for service improvement. These findings underscore the importance of adopting a patient-centered approach and leveraging digital data

sources to enhance healthcare service quality and decision-making.

Despite these contributions, several limitations should be acknowledged. The analysis relies exclusively on online reviews, which may not fully represent all patient groups, particularly individuals with limited access to digital platforms. Furthermore, the dataset is confined to selected leading hospitals, which may limit the generalizability of the findings to smaller or rural healthcare institutions. The use of sentiment analysis tools also presents methodological constraints, as such techniques may not fully capture contextual meaning, sarcasm, or linguistic nuances, potentially affecting classification accuracy. In addition, the cross-sectional nature of the study does not account for temporal changes in patient perceptions and experiences.

Future research can extend this study by incorporating a more diverse dataset that includes a broader range of healthcare institutions, particularly in rural and underserved regions. Combining online review data with traditional survey-based approaches could further enhance the validity and reliability of findings. Moreover, the application of advanced machine learning and deep learning techniques may improve the precision of sentiment classification and enable more sophisticated analysis of textual data. Longitudinal studies are also recommended to examine how patient satisfaction evolves over time, while comparative research across different countries could provide valuable insights into cultural and systemic variations in healthcare experiences. Finally, integrating established theoretical frameworks, such as the Avedis Donabedian model of structure–process–outcome, may offer deeper theoretical grounding and enrich future analyses of healthcare service quality.

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Institutional Review Board Statement: This study followed ethical standards for human research. Participants were informed about the study purpose, voluntary participation, confidentiality, and their right to withdraw at any time, and all data were used solely for academic purposes.

Data Availability Statement: The data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest: The author declares no conflict of interest.

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