



Article

Transforming Healthcare Quality Through Patient Sentiment Analytics: A Data-Driven Framework for Patient-Centered Quality Improvement

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Abstract: Background: Patients serve as vital quality indicators for healthcare facilities because they provide direct feedback about their medical service experiences. Healthcare providers need to understand communication patterns and provider trust and patient-centered care and service efficiency affect medical service quality that will improve patient care quality. Methods: The study included 165 healthcare users who participated in a quantitative cross-sectional survey after they received medical services. The questionnaire collected data about patient experiences and physician communication and provider trust and patient-centered care and service efficiency and healthcare quality through five-point Likert scales. IBM SPSS Statistics 29.0 to perform descriptive statistics and Pearson correlation analysis, which they used to study the characteristics of survey participants. Results: Healthcare services received positive feedback from patients. The highest mean score appeared in Physician communication which scored 4.31 ± 0.65 followed by provider trust at 4.29 ± 0.68 and healthcare quality at 4.21 ± 0.69 . Positive and very positive patient sentiment accounted for 68.5% of responses. Healthcare quality improvement should start with Communication (22.4%) and provider trust (19.4%) because they represent the most essential elements. Pearson correlation analysis showed that healthcare quality maintained strong relationships with patient experience ($r = 0.804$), provider trust ($r = 0.779$), communication ($r = 0.736$), and service efficiency ($r = 0.691$) but waiting time maintained a moderate negative relationship ($r = -0.518$). Conclusion: Healthcare organizations need to develop their patient-centered communication abilities while building provider trust and enhancing service efficiency and decreasing waiting times to achieve better patient satisfaction.

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Keywords: Patient sentiment analytics, Healthcare quality improvement, Patient-centered care, Physician communication, Provider trust.

1. Introduction

Healthcare organizations across the globe have started to adopt patient-centered care because they now view patient experiences and feelings as vital measures that determine the quality of medical services [1]. Healthcare providers now understand that clinical results no longer represent the full definition of quality because patients now base their healthcare evaluation on their personal experiences with providers and service availability and their trust in medical professionals [2]. Healthcare quality improvement has become a crucial research area that focuses on understanding how patients feel about their medical care [3]. Patient sentiment describes patients emotionally responding to healthcare services

through their feelings of satisfaction and their trust levels and their perceptions of service quality and their complete experience [4]. The digital health platform growth, along with telemedicine expansion and online feedback system development, has brought about an abundance of patient-created data that exists today [5]. Policymakers can study healthcare service operations through these information sets, which also allow them to access patient-based healthcare quality data [6]. Healthcare organizations can identify their service delivery strengths and weaknesses through patient sentiment analysis, which helps them create specific improvement plans [7].

The way healthcare providers talk with their patients creates the most important element which determines patients perceive their healthcare experience [8]. Medical staff communicate effectively help patients understand their medical conditions and treatment plans better which results in higher patient compliance with medical instructions and builds stronger healthcare relationships between providers and their patients [9]. Healthcare services lose patient trust because staff members fail to communicate properly which allows miscommunication to occur [10]. Healthcare organizations have established communication effectiveness as their fundamental standard which determines their total quality performance [11]. Patients develop medical outcomes through their interactions with healthcare providers because provider trust functions as an essential factor which drives their recovery process [12]. Medical advice from healthcare providers achieves better results through patient trust because patients follow medical advice while they actively participate in their care and experience improved treatment satisfaction [13]. Patient-centered care follows the same approach because it respects what patients need and their personal values while making sure they have an active role in decision-making processes [14]. The method leads to increased patient satisfaction together with enhanced healthcare experiences which prove its effectiveness.

Healthcare organizations across different regions face two main obstacles which block their ability to deliver care and maintain running their operational systems [15]. Patients experience poor satisfaction and healthcare quality deterioration because they must wait for extended periods while facing restricted hospital access and doctors provide substandard care [16]. Healthcare facilities need better accessibility and improved operational efficiency to develop patient-centered healthcare systems which will benefit their patients. Healthcare quality before they focused on individual elements like satisfaction and communication need to perform studies which combine different aspects of patient emotions [17]. Doctors need to learn about each factor which affects healthcare quality to properly recognize their combined effects on healthcare system enhancement. The present study uses a structured questionnaire to analyze patient emotions which will help healthcare facilities enhance their service quality. The study will provide healthcare professionals with research-based evidence about how patient emotions affect their ability to enhance service quality in healthcare systems.

2. Materials and Methods

2.1 Study Design and Participants

A quantitative survey method collected data at a single point in time to study patient feelings relate to healthcare service quality advancements throughout the United States healthcare system. The study obtained its data through an online questionnaire which researchers sent out through email invitations and social media platforms while using convenience and snowball sampling methods. The study accepted participants who reached 18 years of age and had used healthcare services during the last 12 months. The study required participants to join voluntarily while preserving their anonymity through a single response submission process which allowed them to send only one answer. The researchers removed all incomplete and duplicate questionnaires during data screening which produced a total of 165 valid responses that became the basis for statistical analysis.

2.2 Survey Instrument and Study Variables

The survey instrument was developed based on an extensive review of the literature related to patient experience, healthcare quality, and patient-centered care. The questionnaire contained two distinct sections that users needed to complete. The research team gathered demographic details during the first section, which included data about participants' gender and their age and their educational background and work status and their usage of healthcare services. Collected participant feedback through five study constructs, which included patient experience satisfaction and healthcare provider trust and patient-centered care and service accessibility and efficiency. The questionnaire items were measured using a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), where higher scores indicated more positive perceptions of healthcare services and quality improvement [18].

2.3 Data Collection and Data Quality Assessment

Data collected through an online survey platform which operated with security features for eight weeks. The process of questionnaire completion required participants to prove their eligibility for the study. The survey design protected respondent privacy by keeping their identity hidden throughout the data collection process. Their initial response screening by checking for complete answers and consistent data patterns and duplicate entries before starting statistical analysis [19]. The researchers removed all unfinished questionnaires and duplicate responses from their complete research data set. The experts evaluated each questionnaire question to assess its clarity and relevance and appropriateness before the complete survey distribution [20].

2.4 Statistical Analysis

Statistical analyses through IBM SPSS Statistics software version 29.0. The study variables together with respondent demographics were summarized through descriptive statistics, which included frequencies and percentages and means and standard deviations [21]. The research team used Pearson correlation analysis to determine how strongly the study variables connect through their linear relationships [22]. Scientists employed Equation (1) to calculate the Pearson correlation coefficient, which became their fundamental statistical measurement [23].

$$r_{XY} = \frac{\sum_{i=1}^n (X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^n (X_i - \bar{X})^2} \sqrt{\sum_{i=1}^n (Y_i - \bar{Y})^2}}$$

Pearson correlation coefficient which measures relationship between X and Y variables appears as r while n represents the total number of observations. The range of correlation coefficients extends from minus one to plus one where positive numbers show direct linear connections and negative numbers show opposite relationships while numbers near zero indicate minimal to no linear connection [24]. Performed two-tailed tests to determine statistical significance and they used a p-value threshold of 0.05 to establish statistical significance during the entire research process [25].

3. Results

3.1 Demographic Characteristics of Respondents

Table 1. Demographic Characteristics of Respondents.

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	74	44.8
	Female	91	55.2
Age (years)	18–29	46	27.9
	30–44	59	35.8
	45–59	38	23.0
	≥60	22	13.3

Education Level	High School or Below	29	17.6
	Bachelor's Degree	71	43.0
	Graduate Degree	65	39.4
Employment Status	Employed	102	61.8
	Self-employed	23	13.9
	Unemployed	18	10.9
	Retired	22	13.3
Healthcare Visits (Past 12 Months)	1–2	68	41.2
	3–5	63	38.2
	≥6	34	20.6

Demographic characteristics from **Table 1** show that the research group of 165 people has an equal representation of different population segments. The sample had more female participants than males with 55.2% females and 44.8% males which shows a balanced gender spread. The research showed that most participants belonged to the 30–44 age range because they made up 35.8% of all respondents. The study then collected 27.9% of respondents from the 18–29 age group and 23.0% from 45–59 years and 13.3% from 60 years and older. The research showed that most participants earned a bachelor's degree with 43.0% of respondents but 39.4% earned a graduate degree and 17.6% finished their education at high school level or less. Employment status showed that the majority were employed (61.8%). Healthcare service usage shows 41.2% of respondents visited medical facilities during their last twelve months which shows average healthcare service utilization among the study group.

3.2 Descriptive Statistics of Patient Sentiment Variables

Table 2. Descriptive Statistics of Patient Sentiment Variables.

Variable	Mean	SD
Patient sentiment	4.18	0.73
Physician communication	4.31	0.65
Patient-centered care	4.15	0.71
Trust in healthcare providers	4.29	0.68
Service efficiency	3.95	0.81
Healthcare quality improvement	4.21	0.69

Descriptive statistics of patient sentiment and healthcare quality variables as presented **Table 2**. The study results show that all measurement constructs achieved high average scores which prove that respondents view healthcare services positively. The highest value appeared in Physician communication at 4.31 ± 0.65 which was followed by trust in healthcare providers at 4.29 ± 0.68 and healthcare quality improvement at 4.21 ± 0.69 . The evaluation of patient sentiment (4.18 ± 0.73) together with patient-centered care (4.15 ± 0.71) received positive assessments from respondents. Service efficiency received the lowest score at 3.95 ± 0.81 which demonstrates it has the least customer satisfaction. The study findings demonstrate that communication together with trust form the most essential elements which affect patient satisfaction and their perception of healthcare service quality.

3.3 Distribution of Patient Sentiment Levels

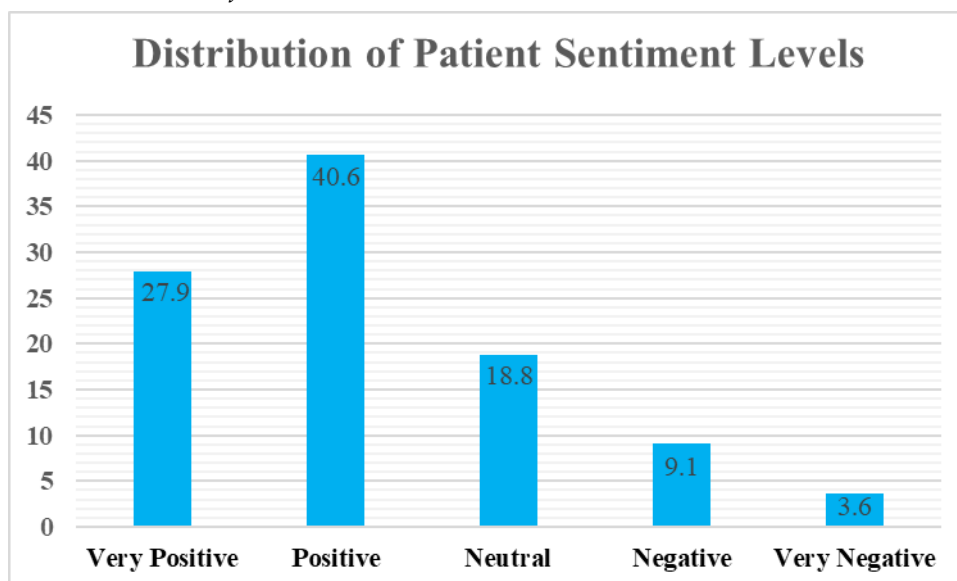


Figure 1. Distribution of Patient Sentiment Levels.

The distribution of patient sentiment levels among respondents as shown in **Figure 1**. The study results revealed that most participants reported positive views about healthcare services which they received. Positive sentiment represented the largest category at 40.6% which combined with very positive sentiment at 27.9% to form a total that exceeded two-thirds of the sample thus showing positive healthcare experiences. The survey received 18.8% neutral responses which show that this group of respondents remains undecided about their level of satisfaction or dissatisfaction. The study found only 9.1% negative sentiment and 3.6% very negative sentiment which shows that most participants did not experience any dissatisfaction. The research shows patients mostly provide positive feedback which proves they received satisfactory healthcare and quality service experiences.

3.4 Healthcare Quality Improvement Priorities

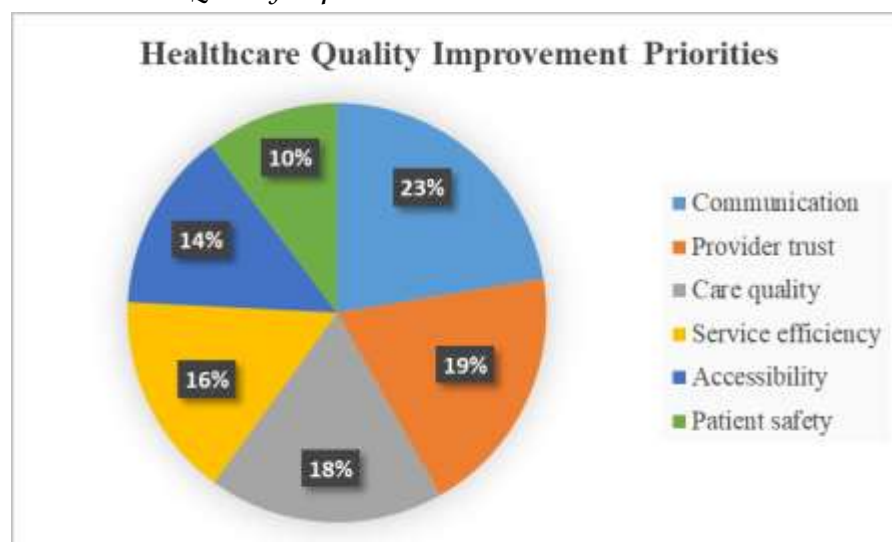


Figure 2. Healthcare Quality Improvement Priorities.

Healthcare quality improvement priorities which respondents identified appear in **Figure 2**. The research shows that communication stands as the most vital area according to 22.4% of respondents because patients need to communicate effectively with their healthcare providers. The following categories received patient value ratings which included provider trust at 19.4% and care quality at 18.2%. Patients demonstrate their highest value for both personal relationships with providers and the medical care they

receive. The data shows that healthcare users require quick access to medical services which they can obtain through convenient service delivery. The results show that patient safety received the lowest percentage at 10.3% but it stays as a vital part of healthcare service delivery. The results show that patients value communication and trust more than structural elements which proves healthcare organizations need to focus on patient-centered methods for their quality enhancement strategies.

3.5 Factors for Healthcare Quality Improvement

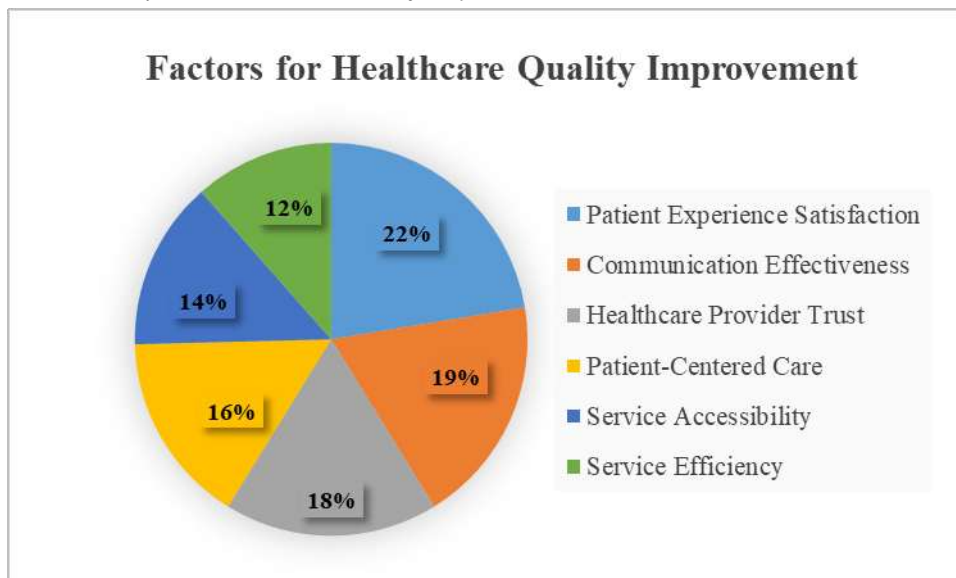


Figure 3. Factors for Healthcare Quality Improvement.

The factors respondents identified as affecting healthcare quality improvement appear in **Figure 3**. The study findings show that patient experience satisfaction holds the highest impact at 22.4% which proves that overall patient experience remains the main factor which affects people see healthcare quality. The study found that communication effectiveness reached 18.8% while healthcare provider trust stood at 17.6% which shows that personal relationships continue to be essential for achieving healthcare quality through trust development. Patient-centered care (15.8%) stands as a vital element because it demonstrates how patients need to participate actively in making decisions about their treatment. The study showed that service accessibility and service efficiency operated as factors which affected results but they held lower importance than other elements at 13.9% and 11.5% respectively. The study shows that healthcare organizations need to focus more on patient experiences and staff relationships instead of their physical facilities when they want to improve healthcare quality.

3.6 Pearson Correlation Matrix Among Study Variables

Table 3. Pearson Correlation Matrix Among Study Variables.

Variables	1	2	3	4	5	6
Patient Experience	1					
Communication	.682	1				
Provider Trust	.731	.654	1			
Waiting Time	-.381	-.426	-.352	1		
Service Efficiency	.618	.586	.641	-.472	1	
Healthcare Quality	.804	.736	.779	-.518	.691	1

1= Patient Experience, 2= Communication , 3= Provider Trust, 4= Waiting Time , 5= Service Efficiency , 6= Healthcare Quality

Pearson correlation results which display the relationships between all study variables as presented in **Table 3**. The research shows that patient experience together with communication and provider trust and service efficiency and healthcare quality all share

powerful positive relationships. Patient experience holds the most substantial link to healthcare quality through a correlation value of 0.804 which shows patients base their service quality perception on this particular aspect. The research shows that communication (0.736) and provider trust (0.779) form strong positive relationships which demonstrate how personal relationships and social interactions matter in healthcare services. Healthcare quality shows an opposite connection to waiting time through a correlation of -0.518 because patients develop lower satisfaction levels and service quality perceptions when they must wait longer. Service efficiency (0.691) shows a strong positive link with healthcare quality.

4. Discussion

The study findings show that patients in this study expressed mainly positive feelings about their healthcare experiences because they viewed communication methods and healthcare provider trustworthiness and service quality in a positive light [26]. Adult participants held different educational levels and medical service usage patterns, which created an effective base to study patient views between different social groups [27]. A majority of workers who had completed their education, which might explain their positive healthcare service feedback because educated people tend to understand healthcare quality better, and they can talk to medical staff more successfully [28]. Descriptive analysis that physician communication received the highest average score of 4.31 ± 0.65 among all study variables. The research team discovered through descriptive analysis that physician communication received the highest average score of 4.31 ± 0.65 among all study variables. The distribution of patient sentiment further supports these findings. The survey results show that 68.5% of respondents experienced positive or very positive experiences but 12.7% of participants reported negative or very negative experiences. Data shows a strong positive trend because most patients expressed satisfaction with their healthcare service experiences. The survey results show that 20% of patients stay neutral about their care which means healthcare providers must enhance their services to deliver consistent medical care.

The respondents identified communication as their primary focus for healthcare quality enhancement which received 22.4% of the responses. Provider trust stands as their second most important aspect at 19.4% and care quality follows with an 18.2% rating. Priorities show that patients choose to focus on healthcare relationships instead of choosing between hospital equipment and staff work systems [29]. Decision-making becomes possible through effective communication which also helps patients understand better and stay involved but trust between patients and healthcare workers leads to better care continuity [30]. The percentages show that accessibility and service efficiency need improvement but these areas received less importance than the quality of patient-provider interactions according to patient preferences [12]. The study revealed that patient experience satisfaction stands as the most powerful factor which drives healthcare quality improvement at 22.4%. The research shows that healthcare organizations now focus on patient-centered care because they measure their service quality through patient perceptions about their healthcare experiences. The research discovered that patient-centered care (15.8%) emerged as a major factor because it underlines the necessity for patients to participate in treatment choices while showing their personal preferences. The research shows that service accessibility (13.9%) and service efficiency (11.5%) affect healthcare quality but their smaller impact compared to other factors indicates that patient evaluations depend more on their direct experiences and their relationships with others.

Pearson correlation analysis produces extra verification which supports the observations that were made. The data shows that patient experience achieves the highest positive correlation with healthcare quality at $r = 0.804$ which demonstrates that better patient healthcare experiences lead to improved service quality perceptions. The data shows that healthcare quality receives strong positive relationships from provider trust

which scored $r = 0.779$ and communication which scored $r = 0.736$. Healthcare organizations need to build trust and maintain effective communication because these two factors serve as essential tools which help them achieve better patient outcomes and patient satisfaction [31]. The data shows that service efficiency which scored $r = 0.691$ has a strong positive relationship with patient perceptions because healthcare delivery efficiency improves the interpersonal quality of care. The study discovered that patient wait times generated a negative moderate correlation with healthcare service quality through a correlation coefficient of -0.518 which demonstrated that longer wait times reduced patient satisfaction despite maintaining good communication and clinical care. The research results demonstrate that healthcare facilities need to decrease patient wait times by using better appointment systems and streamlining their work processes and staff distribution. Medical service providers need to shorten their waiting periods because they need to reach full healthcare quality improvement through communication and trust established with their patients.

5. Conclusion

Healthcare quality enhancement depends entirely on value-based principles which stem from how patients perceive their care experience. Communication along with provider trust and patient experience form the primary elements which create value for patients who assess their healthcare quality. Perception through this process which needs efficient service delivery. Patient relationships and emotional experiences with healthcare providers create more healthcare value than the physical infrastructure of medical facilities. Healthcare organizations need to establish patient-centered methods which focus on better communication and trust development and enhanced service delivery to achieve maximum patient value perception and maintain continuous healthcare quality advancement.

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