Analysis of factors affecting inpatient satisfaction and loyalty based on the SERVQUAL model : the moderating effect of recommendations from relatives and friends

LINGZHAO MENG

This research report is part of the PhD program
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Researcher : LINGZHAO MENG

Degree : Doctor of Philosophy

Field of study : Organization Management and Development

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

IN ORGANIZATIONAL MANAGEMENT AND DEVELOPMENT

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During the process of writing this paper. I would like to thank my university for giving me the opportunity to study. During the study, the teacher gave me detailed guidance from topic selection, paper framework to detail modification, and put forward many valuable opinions and suggestions. The teacher's rigorous attitude towards scholarship, high professionalism, conscientious and diligent work style and bold and innovative enterprising spirit have had an important influence on me. Professor Sujitra Samakkeetham and Professor Chenin Chen's profound knowledge, broad vision and keen thinking also deeply inspired me. This paper was completed under the careful guidance and strong support of Professor Sujitra Samakkeetham and Professor Chenin Chen. With the careful guidance and assistance of Professor Wangkun Chen and Professor Suwimon, I wrote very well. I would like to thank Professor Shuzhong Chen and Professor Chaodong Meng for their enthusiastic help in my studies and life.

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LINGZHAO MENG

ชื่อเรื่อง : การวิเคราะห์ปัจจัยที่ส่งผลต่อความพึงพอใจและความภักดีของผู้ป่วยใน ตาม SERVQUAL แบบจำลอง: ผลการบรรเทาของคำแนะนำจากญาติและเพื่อน
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ชื่อปริญญา : ปรัชญาดุษฎีบัณฑิต (การจัดการและพัฒนาองค์การ)
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บทคัดย่อ

การศึกษาแบบจำลองคุณภาพบริการและแบบสอบถามความพึงพอใจของผู้ป่วยในที่ออก โดยศูนย์การจัดการการแพทย์แห่งชาติ นี้ได้ทำการสำรวจผู้ป่วยใน 415 คน เพื่อสำรวจปัจจัยที่มีผลต่อประสบการณ์ทางการแพทย์และความภักดีของผู้ป่วย เพื่อให้เป็นพื้นฐานสำหรับการปรับปรุงคุณภาพบริการของโรงพยาบาล วิธี การ : วิธีการสำรวจแบบสอบถามถูกใช้เพื่อคัดเลือกผู้ป่วยใน 415 คนจากโรงพยาบาลตติยภูมิในมณฑลซานซีตั้งแต่วันที่ 9 พฤษภาคม 2024 ถึง 14 พฤษภาคม 2024 เป็นผู้ตอบแบบสอบถาม ความ คิดเห็นแบบเปิดของผู้ ป่วย ในได้รับการสรุปและจำแนกตามแบบ จำลอง SERVQUAL ใช้ ชุดซอฟต์แวร์สถิติ SPSS26.0 และ AMOS 24.0 ใน การ วิเคราะห์และประมวลผลข้อมูล ใช้ สถิติเชิงพรรณนา ความน่าเชื่อถือ ความ ถูก ต้อง การ วิเคราะห์ความสัมพันธ์ การวิเคราะห์ปัจจัยยืนยัน แบบจำลองสมการโครงสร้าง และ วิธีการทางสถิติอื่นๆ สำหรับการประมวลผลข้อมูล ผล การศึกษา : ในการประเมินคุณภาพบริการทางการแพทย์ มี ตัวแปร 17 ตัว ได้แก่ ความเป็นรูปธรรม ความ น่าเชื่อถือ การ ตอบสนอง ความมั่นใจ ความ เห็นอกเห็นใจ ความ เต็มใจ ที่จะเข้ารับการรักษาอีกครั้ง การ บอกต่อแบบปากต่อปาก พฤติกรรม ความ ภักดี เวลา การ รอ คอย การสื่อสารทางการแพทย์ ผลการรักษา การ สื่อสารแบบปากต่อปาก โซเชียลมีเดีย คำ แนะนำ จากญาติและเพื่อน การ ประเมิน ออนไลน์ คำแนะนำจากผู้เชี่ยวชาญ และ รายงานจากสื่อ ซึ่งล้วนมีความสัมพันธ์ในทางบวก คุณภาพบริการมีผลกระทบเชิงบวกอย่างมีนัยสำคัญต่อคำแนะนำ คำแนะนำต่อความพึงพอใจ คุณภาพ บริการต่อความพึงพอใจ และ ความพึงพอใจต่อความภักดี

สรุป : ความพึงพอใจของผู้ป่วยในและความภักดีของผู้ป่วยในได้รับความสนใจเพิ่มมากขึ้น ในฐานะ ตัวชี้วัดหลักในการวัดผลการดำเนินงานของโรงพยาบาลและคุณภาพบริการ การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อวิเคราะห์ความสัมพันธ์โดยเนื้อแท้ระหว่างความพึงพอใจของผู้ป่วยในและความภักดี และ พิจารณา คำแนะนำจากญาติและเพื่อนเป็นตัวแปรปรับ เพื่อเปิดเผยบทบาทเฉพาะตัวของตัวแปรดังกล่าวในเส้นทางการ มี อิทธิพล แบบจำลองช่องว่างคุณภาพบริการนั้นสามารถทำได้จริงในการวิเคราะห์และการใช้ความพึงพอใจของผู้ป่วยใน และ เน้นย้ำถึงความสำคัญของการปรับปรุงความเป็นรูปธรรมและความน่าเชื่อถือของสถานพยาบาลเพื่อปรับปรุงประสบการณ์ของผู้ป่วย โดยให้แนวคิดการวิเคราะห์เชิงทฤษฎีที่เชื่อถือได้สำหรับผู้จัดการโรงพยาบาลเพื่อปรับปรุงคุณภาพของบริการทาง

การแพทย์ ความ พึงพอใจโดยรวมของผู้ป่วยในนั้นสูง โดย เฉพาะอย่างยิ่งในแง่ของการรับประกันและการตอบสนอง จะ เห็นได้ว่างานบริการคุณภาพสูงที่ดำเนินการทั่วประเทศนั้นประสบความสำเร็จอย่างมีนัยสำคัญ ซึ่ง บ่งชี้ว่าด้วยการจัดตั้งระบบความปลอดภัยทางการแพทย์แห่งชาติและการปรับปรุงอย่างต่อเนื่องของตลาดการแพทย์ คุณภาพ ของเทคโนโลยีทางการแพทย์และคุณภาพโดยรวมของบุคลากรทางการแพทย์ได้รับการปรับปรุงในระดับหนึ่ง อย่างไรก็ตาม ไม่ ได้เป็นสัดส่วนกับประสบการณ์ทางการแพทย์จริง ผู้ ป่วย ในได้รับคะแนนต่ำในด้านความเป็นรูปธรรมและความน่าเชื่อถือ ซึ่ง ทำให้สถาบันทางการแพทย์มีข้อกำหนดที่สูงขึ้นในการให้บริการที่สะดวกและรวดเร็ว ความ ไม่พอใจของผู้ป่วยในส่วนใหญ่กระจุกตัวอยู่ในมิติที่จับต้องได้ เช่น สถานพยาบาลและสภาพแวดล้อมของโรง พยาบาล ขอแนะนำให้สร้างการสื่อสารที่มีประสิทธิภาพระหว่างพยาบาลและคนไข้ เข้าใจประสบการณ์ทางการแพทย์ของผู้ป่วย เพิ่ม ประสิทธิภาพ กระบวนการทางการแพทย์ และ ลดเวลาการรอคอยของผู้ป่วย ภาย ใต้ สมมติฐานของการรักษาความปลอดภัยและคุณภาพทางการแพทย์

คำสำคัญ : ประสบการณ์ผู้ป่วยใน, คุณภาพการบริการ. แบบความพึงพอใจ, ความจงรักภักดี, คำแนะนำ, ผลการควบคุม

Title : Analysis of factors affecting inpatient satisfaction and loyalty based on the SERVQUAL model : the moderating effect of recommendations from relatives and friends
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Institute : Pacific Institute of Management Science

Abstract

Purpose : Based on the service quality model and the inpatient satisfaction questionnaire issued by the National Medical Management Center, this study surveyed 415 inpatients to explore the factors affecting patients' medical experience and loyalty, And analyze the moderating role of recommendations from friends and relatives (word-of-mouth communication) in the relationship between service quality and patient satisfaction and loyalty. Methods : A questionnaire survey method was used to select 415 inpatients from a tertiary hospital in Shanxi Province from May 9, 2024 to May 14 , 2024 as the survey subjects. The open opinions of inpatients were summarized and classified based on the SERVQUAL model. SPSS26.0 and AMOS24.0 statistical software packages were used to analyze and process the data. Descriptive statistics , reliability , validity , correlation analysis , confirmatory factor analysis , structural equation model and other statistical methods were used for data processing. At the same time , the impact of service quality on patient satisfaction and loyalty, as well as the moderating role of recommendations from relatives and friends, were examined.

Results : In the evaluation of medical service quality, 17 variables including tangibility, reliability, responsiveness, assurance, empath , willingness to seek medical treatment again , word-of-mouth publicity , loyalty behavior , waiting time, medical communication , treatment effect, word-of-mouth communication, social media, recommendation by relatives and friends, online evaluation, professional recommendation, and media reports were positively correlated. Service quality has a significant positive impact on recommendation, recommendation on satisfaction , service quality on satisfaction , and satisfaction on loyalty. Conclusion: As key indicators for measuring hospital performance and service quality, inpatient satisfaction and loyalty have received

increasing attention. This study aims to deeply analyze the intrinsic relationship between inpatient satisfaction and loyalty, and innovatively considers recommendation from relatives and friends as a moderating variable, to reveal its unique role in the influencing path. The service quality gap model is feasible in the analysis and application of inpatient satisfaction, and emphasizes the importance of improving the tangibility and reliability of medical facilities to improve patient experience. It provides a reliable theoretical analysis idea for hospital managers to improve the quality of medical services. The overall satisfaction of inpatients is high, especially in terms of assurance and responsiveness. The high-quality service work carried out nationwide has achieved significant results, indicating that with the establishment of the national medical security system and the continuous improvement of the medical market, the quality of medical technology and the comprehensive quality of medical staff have been improved to a certain extent. However, it is not proportional to the actual medical experience. Inpatients scored low in tangibility and reliability, which puts higher requirements on medical institutions to provide convenient and fast services. Inpatient dissatisfaction is mainly concentrated in tangible dimensions such as hospital facilities and hospital environment. It is recommended to establish effective communication between nurses and patients, understand patients' medical experience, optimize medical processes, and reduce patients' waiting time, under the premise of ensuring medical safety and quality.

Keywords : inpatient experience, Service Quality, Model satisfaction, loyalty recommendation, moderating effect

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Chapter1
Introduction

1.1 Research background and significance of the problem

Improving medical service capabilities is a major measure to promote the development of a healthy China and high-quality development of hospitals, and is of great significance to improving people's experience and sense of gain in medical treatment. In recent years, improving medical service capabilities has always been an area of focus for the government. Patient satisfaction, as the "gold standard" of modern hospital quality management, directly reflects the overall quality and effectiveness of medical services and hospital management. According to the "Action Plan for Further Improving Medical Service Levels (2018-2019)" and "Key Work Plan for Further Improving Medical Service Levels", improving medical service capabilities, promoting high-quality development of the health industry, and protecting the health of the people have become important goals of health work (National Health and Family Planning Commission, 2017).

Patient satisfaction is a relatively subjective indicator for measuring medical services. Although it can help hospitals understand which services are recognized by patients and which aspects need improvement, it lacks specific and operational measures for improving medical management. As a standard for evaluating the quality of medical services, patient experience is not only objective and quantifiable, but also can trace the deficiencies in the medical service process and more accurately grasp the actual needs of patients (Parasuraman, Zeithaml, & Berry, 1988, pp.12-40). Therefore, evaluating medical services from the perspective of patient experience is of great significance for improving the quality of medical services in China and optimizing the medical management mechanism.

In today's society, with the continuous advancement of medical technology and the continuous improvement of the medical service system, the satisfaction and loyalty of inpatients have gradually become the core indicators for measuring the service quality of medical institutions. Patient satisfaction and loyalty are not only directly related to the reputation and economic benefits of medical institutions, but also an important criterion for measuring whether medical services meet the needs of patients and whether they have sustainable development capabilities. Inpatient satisfaction refers to the subjective evaluation of patients on the degree to which the services provided by medical institutions meet their expectations. Patients with high satisfaction are more likely to trust medical institutions and thus show high loyalty.

Loyalty refers to the patient's continued trust and preference for medical institutions, which is reflected in the patient's re-selection of medical institutions and the recommendation behavior to relatives and friends. First, from the perspective of social and economic development, with the rapid development of my country's social economy, people's living standards are constantly improving, and the demand for medical services is also growing. However, under the circumstances of uneven distribution of medical resources and uneven medical service levels, there is a large gap between patients' expectations and reality of medical services, resulting in generally low patient satisfaction and loyalty. Secondly, from the perspective of the competitive situation in the medical industry, with the continuous opening of the medical market, competition among medical institutions is becoming increasingly fierce. As consumers of medical services, patients' satisfaction and loyalty have become the key for medical institutions to compete for market share. Therefore, studying the influencing factors of inpatient satisfaction and loyalty is of great significance for medical institutions to improve their competitiveness. Thirdly, from the perspective of improving the quality of medical services, patient satisfaction and loyalty are important indicators for measuring the quality of medical services. Through the study of patient satisfaction and loyalty, we can reveal the problems and deficiencies in medical services, provide improvement directions for medical institutions, and thus improve the quality of medical services.

Service quality is one of the core factors affecting patient satisfaction. The SERVQUAL model (Parasuraman, Zeithaml, & Berry, 1985, pp. 41-50) is a classic tool for evaluating service quality, covering five dimensions: 1. Tangibles: physical conditions such as medical facilities, equipment, and environment. 2. Reliability: Whether the hospital can accurately and reliably provide the promised services. 3. Responsiveness: Whether medical staff are willing to help patients in a timely manner. 4. Assurance: The professional, attitude and trust of medical staff. 5. Empathy: Whether the hospital provides personalized care and understands patient needs. This model is widely used in the medical field, but there is still room for exploration in research on inpatients, especially in combination with social recommendation factors.

When choosing medical services, patients often rely on recommendations from relatives and friends rather than pure advertising or official information. Such trust-based recommendations may strengthen or weaken patients' perception of service quality: if relatives and friends have a high evaluation of a hospital, patients may be more inclined to recognize its service quality, thereby improving satisfaction. On the contrary, if relatives and friends have negative experiences, patients may still be

skeptical even if the actual service quality of the hospital is acceptable.

Therefore, this study will explore whether recommendations from relatives and friends play a moderating role between SERVQUAL dimensions and patient satisfaction/loyalty, in order to reveal the actual effect of how social factors affect the quality of medical services.

In the research of domestic and foreign scholars, inpatient satisfaction and loyalty have received widespread attention. How ever, existing research still has certain limitations, such as the lack of discussion on the moderating variable of recommendation by relatives and friends, as well as the inadequacy of research methods and sample range. In summary, this study takes the satisfaction and loyalty of inpatients as the research object, and takes the recommendation of relatives and friends as the moderating variable to explore the factors affecting the satisfaction and loyalty of inpatients. Through the review of relevant literature, empirical analysis and result discussion, it aims to provide theoretical basis and practical guidance for medical institutions to improve patient satisfaction and loyalty and enhance the quality of medical services.

According to data released by the Statistical Information Center of the National Health Commission, from January to November 2021, the number of people discharged from medical and health institutions nationwide was 222.065 million. China's inpatient population is huge and worthy of attention (National Health Commission Statistical Information Center, 2021). Based on this, in the field of medical services, improving the satisfaction and loyalty of inpatients is a core issue of hospital management. This study focuses on exploring how the satisfaction of inpatients affects their loyalty, and introduces recommendations from relatives and friends as a moderating variable to reveal the influencing mechanism. With the intensification of market competition and the diversification of patient needs, an in-depth understanding of the transformation path from satisfaction to loyalty, and the role of recommendations from relatives and friends in this process, is of great theoretical and practical significance for hospitals to optimize service strategies and enhance market competitiveness.

This study constructs an index of inpatient experience, scientifically quantifies patient experience, and focuses on exploring the relationship between patient experience and satisfaction, loyalty, and recommendation, providing data support for improving the high-quality development of hospital services and management.

Help hospital managers identify key service quality dimensions, optimize resource allocation, and increase patient loyalty by incentivizing positive word-of-mouth.

1.2 Research Objective

Considering that the current medical and health system in mainland China is different from that in Europe and the United States, inpatient treatment in large comprehensive hospitals is still the starting point of the medical process for most patients. The experience and feelings of the hospitalization stage can easily make patients form a basic understanding of whether they are satisfied with the entire hospital, and through word of mouth, it affects the reputation and image of the hospital. So far, the research on patient satisfaction in China has focused on the measurement and analysis of the satisfaction of inpatients (discharged) in the hospital. On the one hand, it is not easy to set up a sampling survey node because the hospitalization time is relatively short; on the other hand, different national conditions also make it easier to obtain and conduct localized research on the inpatient satisfaction scale of large comprehensive hospitals abroad. At the same time, considering the space limitation, the scope of this article is mainly positioned in the evaluation of inpatient satisfaction in large comprehensive hospitals, and strives to provide a modeling idea for patient. The main research objectives of this paper are: based on the five dimensions of the SERVQUAL model (tangibility, reliability, responsiveness, assurance, and empathy), systematically analyze the differentiated impact of each dimension of medical service quality on inpatient satisfaction, and identify the most influential key dimensions. This research examines the mechanism by which inpatient satisfaction affects their loyalty. The focus of this study is to explore the moderating role of social factors recommended by relatives and friends in the following two relationships: the moderating effect between service quality and patient satisfaction, and the moderating effect between patient satisfaction and loyalty. Based on domestic and foreign customer satisfaction and patient satisfaction theories and evaluation methods , scientific methods are used to improve patient satisfaction evaluation tools, optimize patient satisfaction scale indicators, and innovate evaluation methods for large comprehensive hospitals ; by constructing a patient satisfaction index model , a more scientific and reasonable patient satisfaction evaluation index system for large comprehensive hospitals is constructed to provide assistance for the formulation of quality improvement measures and service development strategies for large comprehensive hospitals. In particular, it provides practical guidance on how to utilize and guide recommendations from relatives and friends.

1.3 Research Scope

Research subjects: The main subjects of the study are inpatients, especially 415 inpatients from a tertiary hospital in Shanxi Province, China. The study collected data through questionnaires to analyze the medical experience, satisfaction and loyalty of these patients.

Time frame: The questionnaire survey will be conducted from May 9th, 2024 to May 14th, 2024. The research period is from January 2024 to July 2024.

Research model: The study is based on the SERVQUAL model (service quality model), which divides service quality into five dimensions: tangibility, reliability, responsiveness, assurance and empathy. The study evaluates the quality of medical services through these five dimensions and explores the impact of these dimensions on patient satisfaction and loyalty.

Research variables:

Independent variable: Medical service quality (Service Quality), including five dimensions.

Dependent variable: Patient Satisfaction and Patient Loyalty.

Moderating variable: Recommendations from Relatives and Friends. The study explores the moderating role of recommendations from relatives and friends between service quality and patient satisfaction and loyalty.

Research questions: The study aims to answer the following core questions:

How does the quality of medical services affect patient satisfaction?

How does the quality of medical services affect recommendations from friends and relatives?

How does the recommendation from friends and relatives affect patient satisfaction?

How does patient satisfaction affect patient loyalty?

Does the recommendation from friends and relatives play a mediating role between service quality and patient satisfaction?

1.4 Research hypothesis

Based on this research framework, the following hypotheses are proposed:

- H1: Service quality has a significant positive impact on satisfaction.
- H2: Service quality has a significant positive impact on recommendation.
- H3: Recommendation has a significant positive impact on satisfaction.
- H4: Satisfaction has a significant positive impact on loyalty.
- H5: Recommendation plays a mediating role in the effect of service

quality on satisfaction.

1.5 Research conceptual framework

This study is based on a literature review to explore the relationship, formation mechanism, development and mutual influence between service quality, recommendation, satisfaction and loyalty. Specifically, the following research model is proposed:

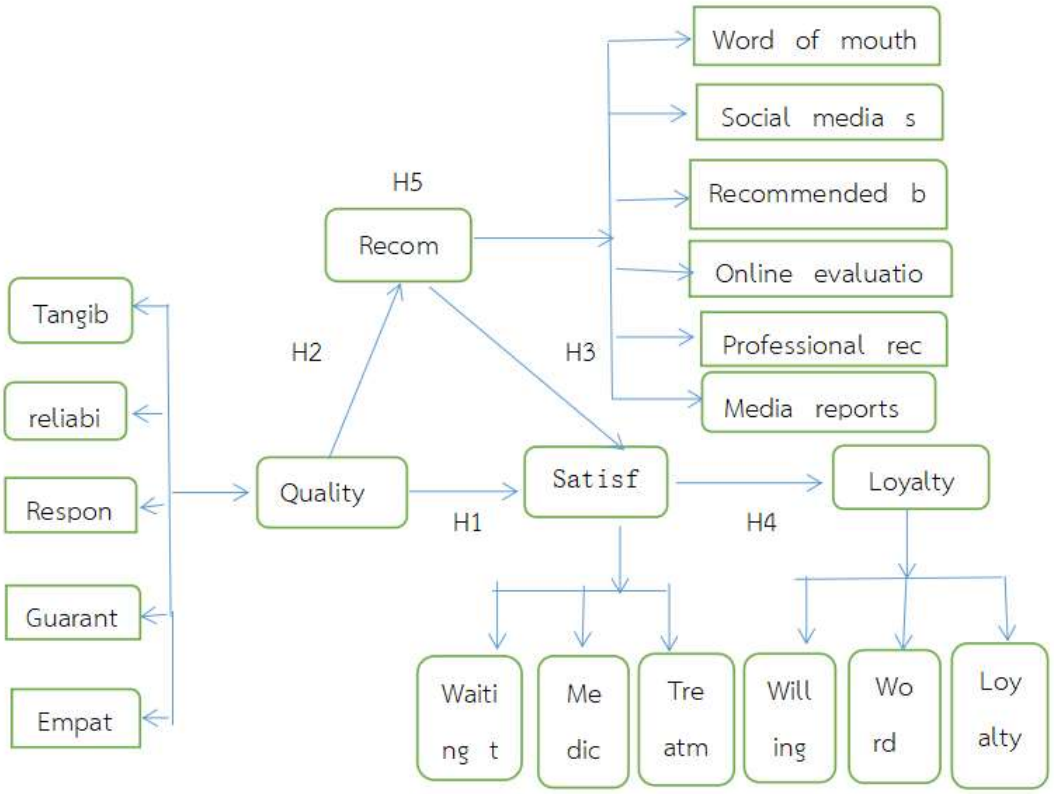

Figure 0.1 Research framework

1.6 Expected Benefits

1.6.1 Practical guidance for hospital management

Optimize service quality: The study clarified the direct impact of the five dimensions of medical service quality (tangibility reliability, responsiveness, assurance, and empathy) on patient satisfaction, providing hospitals with improvement directions. For example, specific measures such as improving the ward environment (tangibility), shortening waiting time (responsiveness), and strengthening doctor-patient communication (empathy) can significantly improve patient experience.

Improve patient loyalty: The study confirmed that patient satisfaction and loyalty are strongly positively correlated (standardized path coefficient 0.965).

Hospitals can monitor satisfaction indicators, optimize service processes in a targeted manner, enhance patients' willingness to return for visits and word-of-mouth recommendation behavior, thereby reducing patient churn and improving long-term competitiveness.

Use the recommendation effect of relatives and friends: Recommendation by relatives and friends as a moderating variable significantly enhances the positive relationship between service quality and satisfaction. Hospitals can establish patient recommendation incentive mechanisms (such as satisfaction reward programs) and optimize online evaluation systems to amplify the word-of-mouth effect and attract more potential patients.

1.6.2 Improvement of patient experience

Focus on weak links: The study found that inpatients scored low on "tangibility" (such as facilities, environment) and "reliability" (such as continuity of treatment), suggesting that hospitals should prioritize improving hardware facilities, optimizing logistics services (such as catering, cleaning), and ensuring the transparency and consistency of the treatment process.

Strengthen doctor-patient communication: The quality of medical communication directly affects patient satisfaction. It is recommended that hospitals regularly train medical staff in communication skills, promote personalized care plans, and enhance patients' trust in the treatment process.

1.6.3 Reference value for medical policies

Improve the evaluation system: The study verified the applicability of the SERVQUAL model in the medical field, which can provide theoretical support for the government to formulate hospital service quality evaluation standards and promote the standardization of medical service quality supervision.

Optimize resource allocation: The study revealed the gap between patient needs and actual experience (such as low scores concentrated in facilities and environment), and it is recommended that policymakers increase investment in hardware construction of grassroots hospitals to promote balanced distribution of medical resources.

1.6.4. Social and economic benefits

Reducing medical costs: Improving patient loyalty can reduce the marketing costs of hospitals to acquire new patients. At the same time, the compliance of patients returning for follow-up visits is higher, which may reduce long-term treatment costs.

Promoting harmony between doctors and patients: By improving service

quality and communication efficiency, reducing conflicts between doctors and patients, and enhancing social trust in medical institutions.

1.7 Definition of specific terms

1.7.1 Service Quality

Definition: Service quality refers to the extent to which medical institutions and their medical staff strictly abide by professional ethics and treatment standards in the clinical treatment process under existing medical technology, capabilities and conditions to provide medical services to patients. It depends on the gap between the patient's actual perception of the service level and their expectations (Parasuraman et al.,1988). In this study, service quality is divided into five dimensions based on the SERVQUAL model: tangibility, reliability, responsiveness, assurance and empathy (pp. 12-40) .

1.7.2 Tangibility

Definition: Tangibility refers to the visible physical environment, equipment and facilities in the medical service process, such as clean and tidy wards and advanced medical equipment. It reflects the patient's intuitive impression of the medical institution and can enhance the patient's trust and satisfaction with the service.

1.7.3. Reliability

Definition: Reliability refers to the ability of medical service providers to accurately and timely complete the promised services. In the field of medical services, it is reflected in the accuracy of medical technology, the accuracy of diagnosis and the continuity of treatment, and is one of the factors that patients care about most.

1.7.4 Responsiveness

Definition: Responsiveness refers to the ability of healthcare providers to respond quickly to patient needs. It includes timely provision of effective healthcare services and rapid satisfaction of patients' expectations, and is a key factor in improving patient satisfaction.

1.7.5 Assurance

Definition: Assurance refers to the ability of medical staff to convey confidence and security to patients through their professional knowledge, technical level, and service attitude. It is reflected in the courtesy, professional ability, and trust building of medical staff with patients.

1.7.6 Empathy

Definition: Empathy refers to the care and concern that healthcare providers show to patients. It includes respect for patients, personalized services, and the ability to understand patients' needs, which can make patients feel warm and comfortable, thereby improving satisfaction.

1.7.7 Patient Satisfaction

Definition: Patient satisfaction refers to the comprehensive subjective evaluation of patients on the degree to which the services provided by medical institutions match their expectations. It is an important indicator of medical service quality, reflecting patients' actual perception of improved health outcomes and their overall evaluation of medical experience (Press, 2002)[1] . In this study, satisfaction includes key indicators such as waiting time, medical communication and treatment effect.

1.7.8. Patient Loyalty

Definition: Patient loyalty refers to the patient's continued trust and preference for medical institutions, which is manifested in the behavior of choosing the institution for medical treatment again and recommending it to relatives and friends. It includes two dimensions: attitudinal loyalty (sense of belonging to the hospital) and behavioral loyalty (actual repeated use of services) (Dick & Basu, 1994). In this study, loyalty is measured by willingness to seek medical treatment again, word-of-mouth publicity and loyal behavior.

1.7.9. Recommendation by Relatives and Friends

Definition: Recommendation by Relatives and Friends refers to the personal experience and word-of-mouth information about medical institutions obtained by patients from relatives and friends, as a form of social influence and information transmission. It plays a bridging role in patients' choice of medical institutions, can enhance patients' trust and satisfaction with services, and reduce the cost of selection. This study uses it as a moderating variable to explore its role in the relationship between service quality and satisfaction and loyalty.

1.7.10. Waiting Time

Definition: Waiting time refers to the length of time a patient waits before receiving medical services. It is an important component of patient satisfaction and

1.7.11. Medical Communication

Definition: Medical communication refers to the communication process between medical staff and patients about their condition, treatment plan and related issues. It includes medical staff's clear explanation of the patient's condition and response to the patient's concerns, and is an important factor affecting patient satisfaction and trust.

1.7.12. Treatment Effect

Definition: Treatment effect refers to the degree to which a patient's symptoms improve after receiving treatment. It is the direct perception of the quality of medical services by patients and is closely related to satisfaction and loyalty.

1.7.13. Word of Mouth

Definition: Word of mouth refers to the positive or negative evaluation of a medical institution by patients or other people in daily communication. It is an informal way of information dissemination that can influence the selection behavior of potential patients and the loyalty of existing patients.

1.7.14. Willingness to Seek Medical Treatment Again

Definition: Willingness to Seek Medical Treatment Again refers to the patient's willingness to choose the same medical institution again when he needs medical services in the future. It is one of the behavioral manifestations of patient loyalty and is affected by service quality and satisfaction.

1.7.15. SERVQUAL Model

Definition: The SERVQUAL model is a theoretical framework for measuring service quality, proposed by Parasuraman et al. (1988) and based on the expectation-perception gap theory. It evaluates service quality through five dimensions (tangibles, reliability, responsiveness, assurance, and empathy), and the score calculation formula is: SERVQUAL score=perception score-expectation score. This study applies it to the field of medical services to analyze the influencing factors of inpatient satisfaction and loyalty (pp.12-40).

1.7.16. Moderating Effect

Definition: Moderating effect refers to how a variable (in this study, recommendation by relatives and friends) changes the intensity or direction of the influence of an independent variable (such as service quality) on a dependent variable (such as satisfaction or loyalty). This study used structural equation modeling (SEM) to verify the moderating effect of

Chapter 2
Literature Review

2.1 SERVQUAL model

SERVQUAL is the abbreviation of "service quality". It was first proposed by American marketing scholars Parasuraman, Zeithaml and Berry in 1988 to measure the service quality of the service industry (Parasuraman et al., 1988, pp. 12-40). The model divides service quality into five key dimensions: tangibility, reliability, responsiveness, assurance and empathy (Zeithaml, Berry, & Parasuraman, 1996, pp. 31-46). The SERVQUAL model is based on the expectation-perception gap theory, which believes that service quality depends on the gap between customer expectations and actual perceptions (Grönroos, 1984, pp. 36-44). The calculation formula is: SERVQUAL score = perception score - expectation score (Oliver, 1980, pp. 460-469). The model uses 22 specific evaluation items to quantify customer expectations and actual experience, and evaluates service quality through surveys (Cronin & Taylor, 1992, pp. 55-68). SERVQUAL has been widely used in various service industries, especially in the field of healthcare, providing strong theoretical support for improving hospital service quality (Babakus & Mangold, 1992, p. 767).

SERVQUAL theory is a new service quality evaluation system proposed in the service industry based on the Total Quality Management (TQM) theory. Its theoretical core is the "service quality gap model", that is , service quality depends on the difference between the service level perceived by users and the service level expected by users (hence it is also called the "expectation-perception" model). User expectations are a prerequisite for providing quality services. The key to providing quality services is to exceed user expectations. Its model is: Servqual score = actual feeling score - expected score.SERVQUAL divides service quality into five levels: tangible facilities, reliability, responsiveness, security, and emotional investment. Each level is further divided into several questions. Through questionnaires, users are asked to score the expected value, actual feeling value and minimum acceptable value of each question. And it establishes 22 relevant specific factors to explain it. Then the service quality score is obtained through questionnaires, customer scoring and comprehensive calculation.

The specific content of the SERVQUAL model consists of two parts: the first part contains 22 small items, which record customers' expectations for excellent companies in a specific service industry. The second part also includes 22 items, which measures consumers' feelings about specific companies in this industry (i.e., the evaluated

companies). Then compare the results obtained in these two parts to obtain each "gap score" of the five dimensions. The smaller the gap, the higher the evaluation of service quality. The greater the distance between consumers' feelings and expectations, the lower the evaluation of service quality. Therefore, SERVQUAL is a scale containing 44 items, and measures consumers' feelings from five service quality dimensions.

The SERVQUAL gap model provides a comprehensive theoretical framework for the quality of medical services. In the field of medical services, patients' demands and expectations for service quality are increasing day by day, and the SERVQUAL model systematically divides service quality from five dimensions, which helps medical institutions to fully understand patient needs and find deficiencies in the service process. The application of the SERVQUAL gap model in the field of medical services has the following advantages: 1.Provides quantitative evaluation criteria: The SERVQUAL model collects patients' expectations and perceptions of medical services through questionnaires, thereby providing quantitative evaluation criteria for the quality of medical services. 2.Diagnose service gaps: The SERVQUAL model can help medical institutions find gapsin the service process and make targeted improvements. 3.Strong adaptability: The SERVQUAL model has good adaptability and can be applied to medical institutions in different regions and different types. 4.Promote service improvement: Through the evaluation of the SERVQUAL model, medical institutions can understand patient needs and formulate targeted service improvement measures (AlOmari, 2020, p. 407-420).

Specific applications of the SERVQUAL gap model in the field of medical services: 1. Service quality evaluation: Medical institutions can use the SERVQUAL model to evaluate the quality of medical services, understand patients' expectations and perceptions of services, and discover deficiencies in services. 2.Service improvement: According to the evaluation results of the SERVQUAL model, medical institutions can make targeted service improvements to improve patient satisfaction. 3.Staff training: Through the SERVQUAL model, medical institutions can understand the performance of employees in service quality, provide training for employees, and improve service quality. 4.Service innovation: The SERVQUAL model can help medical institutions understand patient needs and provide direction for service innovation. 5.Patient satisfaction survey: Medical institutions can use the SERVQUAL model to conduct patient satisfaction surveys, understand patients' evaluation of medical services, and provide a basis for continuous improvement. In short, the application of the SERVQUAL gap model in the field of medical services has important theoretical and practical significance. Through this model, medical institutions can fully

understand patient needs and discover deficiencies in the service process, thereby improving the quality of medical services and enhancing patient satisfaction and loyalty. However, it should be noted that the SERVQUAL model is not perfect, and its application in the field of medical services still needs to be adjusted and optimized based on actual conditions.

2.1.1 Tangibility

Tangibles: refers to the visible elements such as the physical environment, equipment, and facilities in the medical service process. In medical services, good tangibility can enhance patients' trust in medical services and improve satisfaction. For example, clean and tidy wards, advanced medical equipment, etc.are important factors in improving tangibility. Tangibles include actual facilities, equipment, and a list of service personnel. Its components are: 1.There are modern service facilities. 2.The service facilities are attractive. 3.Employees have neat clothes and coats, etc. 4.The company's facilities match the services they provide .

2.1.2 Reliability

Reliability: refers to the ability of medical service providers to accurately and timely complete the promised services. In the field of medical services, reliability is one of the factors that patients care about most.The reliability of medical services is reflected in the precision of medical technology, the accuracy of diagnosis, and the continuity of treatment. Its components are: 1. Things promised to customers can be completed in time; 2.When customers encounter difficulties, they can show care and help; 3.The company and organization are reliable ; 4.The promised services can be provided on time ; 5.The relevant records are correctly recorded .

2.1.3 Responsiveness

Responsiveness: refers to the ability of medical service providers to respond quickly to patients' needs. During the medical service process, patients have high expectations for the responsiveness of medical services. Responding quickly to patients' needs and providing timely and effective medical services are the key to improving patient satisfaction. Its components include: 1. Being able to tell customers the exact time of service ; 2.Providing timely services ; 3. Employees are willing to help customer; 4. The services provided by employees meet the needs of customers.

2.1.4 Guarantee

Etiquette of medical service providers. In the field of medical services, assurance is reflected in the technical level, service attitude and professional knowledge of medical staff. Improving assurance helps to enhance patients' trust and

loyalty to medical services. Its components are: 1. Employees are trustworthy; 2.Customers feel assured when providing services; 3. Employees are polite; 4.Employees can get appropriate support from the company to provide better services .

2.1.5 Empathy

Empathy: refers to the care and concern that healthcare providers show to patients. In the healthcare service process, empathy is an important factor affecting patient satisfaction and loyalty. The care and respect that medical staff show to patients can make patients feel warm and comfortable, thereby improving satisfaction. Its components include: 1.The company provides personalized services to customers; 2. Employees give individual care to customers; 3. Employees are expected to understand customer needs; 4. Customer interests are given priority; 5. Service hours are provided to meet the needs of all customers.

In the past decade, the model has been widely accepted and adopted by managers and scholars. The model is based on the difference theory, that is, the difference between customers' expectations of service quality and the actual services they receive from service organizations. Research shows that SERVQUAL is suitable for measuring information system service quality. SERVQUAL is also an effective tool for evaluating service quality and deciding on actions to improve service quality.

2.2 Quality of medical services

The Medical Quality Management Measures (2016) issued by the National Health and Family Planning Commission of China defines medical quality as the extent to which medical institutions and their medical staff strictly abide by the requirements of professional ethics and treatment standards in the process of clinical treatment and provide medical services to patients under current medical technology, capabilities and conditions (Dai, Lyu, Yu, Zhou, & He et al.,2024, pp.1–20). Donabedian (1988) proposed a three-step framework of structure-process-outcome, which is a widely used model for measuring medical quality. The model shows that medical quality is a combination of structure, process and outcome, aiming to provide patients with the lowest and most appropriate medical services to achieve the best health status (pp.1743–1748).

Various scholars have explored specific evaluation models of service quality, such as: data envelopment analysis (DEA) method; KANO model; SERVQUAL model and SERVVPERF model.

In 1988, the U.S. Office of Technology Assessment proposed that the

quality of medical services refers to the use of medical knowledge and technology. Under existing conditions, the quality of medical services is the degree to which patients' expected results are increased and undesired results are reduced (Zhang, 2014, pp. 19-24). Avedis Donabedian, the father of American medical quality management, believes that the quality of medical services is the ability to achieve the desired goals (restoring the physical and mental health of patients and satisfaction) by reasonable methods. On this basis, some scholars also believe that the quality of medical services is the overall quality that can be perceived by medical consumers, which is jointly affected by the expected service and the actual experience of the service level. The expected service is generated before the medical consumer accepts the medical treatment, while the experience service is generated in the interactive process of the service. Therefore, the quality of medical services refers to the comparison between the medical service level actually perceived by medical service consumers (that is, the experienced service quality) and their expectations of service quality (that is, the expected service quality).

There is no consensus on the evaluation criteria for medical service quality at home and abroad. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in the United States proposed to evaluate the quality of medical services using nine dimensions, including efficacy, suitability, efficiency, respect and care, safety, continuity, effect, timeliness and accessibility. Avedis Donabedian also evaluated the quality of medical services from three aspects: structure, process and output. However, the quality of medical services is mainly the perceived evaluation of patients in medical institutions (Parasuraman et al., 1988: 12-40). in the United States summarized service quality into five elements. This service quality model has a high reference value for the evaluation of medical service quality. Based on this, the basic connotations of the five elements of medical service quality can be summarized: 1.Reliability, which refers to the ability of medical institutions to reliably and accurately fulfill their service commitments ; 2.Sensitivity, also known as responsiveness, refers to the desire to help patients and provide services quickly; 3. Assurance, which refers to the knowledge, etiquette and ability to express confidence and feasibility of medical staff ; 4. Empathy, which refers to putting oneself in the patient's shoes and giving special attention to patients; 5.Perceptibility, which refers to the facilities, equipment, environment, personnel and communication information of medical institutions .

2.3 Patient loyalty

The concept of patient loyalty originates from the customer loyalty theory

in business management, which refers to the customer's preference for a brand or enterprise and the behavior of repeated purchases (Dick & Basu, 1994, pp. 99-113). Applied to medical management, patient loyalty refers to the patient's positive attitude towards a medical institution and his willingness to choose the institution for treatment in the future (Gremler & Brown, 1999, pp. 271-293). Patient loyalty can be divided into attitudinal loyalty (referring to the patient's sense of belonging to the hospital) and behavioral loyalty (referring to the patient's actual repeated use of hospital services) (Bloemer & Ruyter, 1998, pp. 499-513). Loyalty, as an important indicator of medical service quality, is directly related to the maintenance of patient relationships and the sustainable development of medical institutions (Nesset & Helgesen, 2009, pp. 327-345).

As an important dimension of medical service quality evaluation, inpatient loyalty has become the focus of academic attention in recent years. Patient loyalty research not only helps medical institutions understand patients' continued trust and preference behavior, but also provides a basis for medical institutions to formulate long-term development strategies. Regarding the current status of inpatient loyalty research, first of all, in terms of concept definition, scholars have different emphases on the understanding of inpatient loyalty. Some scholars believe that inpatient loyalty refers to patients' continued trust and preference for medical institutions, which is reflected in patients' re-selection of medical institutions and recommendation behavior to relatives and friends. Another group of scholars emphasizes that loyalty also includes patients' word-of-mouth communication and positive feedback behavior on medical institutions . In terms of research content , inpatient loyalty research mainly focuses on the following aspects : First , factors affecting loyalty : Research scholars have explored factors affecting inpatient loyalty from multiple perspectives , such as medical service quality , attitude of medical staff , treatment effect , hospital environment, etc. The study found that high-quality medical services and good doctor-patient relationship are the key to improving patient loyalty. Second, the measurement method of loyalty : In order to accurately measure the loyalty of inpatients , scholars have developed a series of measurement tools, such as loyalty scales, satisfaction and loyalty relationship models, etc. These measurement methods provide medical institutions with quantitative standards for evaluating patient loyalty. Third, the formation mechanism of loyalty : The formation mechanism of inpatient loyalty is one of the research hotspots. Through empirical research, scholars have found that the formation of patient loyalty is a complex process involving multiple links such as patient expectations, actual experience, and satisfaction. Among them, patient

satisfaction is the basis for the formation of loyalty. Fourth, the effect analysis of loyalty. The effect analysis of inpatient loyalty is also an important part of the research. The study found that patients with high loyalty not only have a continuous preference for medical institutions, but also can bring new patient resources to medical institutions through word-of-mouth communication. Fifth, in terms of research methods, the research on inpatient loyalty mainly uses questionnaire surveys , in-depth interviews , case analysis and other means. The questionnaire survey method reveals the general law of patient loyalty through large sample statistical analysis ; the in-depth interview method can deeply understand the loyalty formation process at the individual level of patients; the case analysis method helps to explore loyalty issues in specific situations. However, although the research on inpatient loyalty has achieved certain results, there are still the following shortcomings : First, the research perspective is limited: the existing research is mostly based on the perspective of medical institutions, focusing on the formation and effect of patient loyalty, and rarely explores the issue of loyalty from the perspective of individual patients and social environment. Second , the research method is single : although the questionnaire survey method is widely used in the research on inpatient loyalty, other research methods such as experimental method and observation method are relatively rarely used , which limits the expansion of the researchperspective. Third, the universality of loyalty measurement tools: the universality of existing loyalty measurement tools remains to be verified. Medical institutions in different regions and types may need to develop loyalty measurement tools suitable for their own characteristics. Fourth, the research on loyalty is out of touch with practice. Although the research on inpatient loyalty has achieved certain results in theory, in practical applications, the understanding and operation of loyalty management in medical institutions are still insufficient. In summary, the research on inpatient loyalty has made significant progress in the definition of concepts , research content , research methods and effect analysis , but it also faces challenges such as limited research perspective, single research method , lack of universality of measurement tools and disconnection between theory and practice.Future research should start from multiple perspectives and methods to deeply explore the formation mechanism and effects of inpatient loyalty and provide medical institutions with more effective loyalty management strategies .

Patient loyalty is related to the willingness to see a doctor and word-of-mouth communication mainly used the verification of loyalty on the willingness to see a doctor and the willingness to spread word-of-mouth communication as the research axis. The relevant literature was collected and empirically studied using quantitative

methods to explore the relationship between patients ' loyalty to doctors or hospitals and their willingness to see a doctor , and further explore the impact on the willingness to recommend word-of-mouth communication. This study took the patients in a medical center in the south as the research object, adopted a questionnaire survey method , collected 296 valid questionnaires, and collected sample data using SPSS 22.0. After reliability and validity analysis, narrative statistics, Pearson product-moment correlation analysis , and regression analysis , the proposed hypotheses were verified and analyzed. Results : The loyalty of doctors or hospitals was positively correlated with the willingness to see a doctor , that is , the higher the patient's loyalty to doctors or hospitals , the more it would affect the willingness to see a doctor. The willingness to see a doctor was positively correlated with the willingness to spread word-of-mouth communication, that is, the higher the willingness to see a doctor, the more it would affect the willingness to spread word-of-mouth communication. Results : The loyalty of patients to doctors or hospitals will affect their willingness to seek medical treatment , and they will recommend the hospital to other patients who need medical treatment, thus achieving word-of-mouth communication and improving the brand image of the hospital or doctor (Cai, Yan, Wang, & Liang, 2022, pp. 11-20).

With the improvement of the quality of life , people's expectations for medical services are increasing day by day , and the hospital management system is also constantly changing. Therefore, it is very important for hospitals to improve patient loyalty in order to seek deeper quality. This paper aims to understand the influencing factors of inpatient loyalty through literature review and analysis, and provide a reference for providing higher quality medical services.

In the article "A Study on Inpatient Loyalty and Its Influencing Factors", Xiong, Luo, Peng, and Lu (2009) selected 281 patients who had been hospitalized in a tertiary hospital for more than 5 days and conducted a survey using a self-designed questionnaire. The results showed that 71.5% of the patients were willing to purchase the medical services of the medical institution again , and 60.1% of the patients were willing to recommend it to their relatives and friends. The factors that affect the willingness of inpatients to repurchase are ranked in order of influence : diagnosis and treatment level , medical expenses , hospital brand , and medical environment ; the factors that affect the willingness of inpatients to recommend are ranked in order of influence : diagnosis and treatment level , hospital brand , recommendations from others , and treatment effects. The results of this study show that the willingness of inpatients to repurchase is higher than their willingness to recommend to others. Therefore, hospitals should strengthen the management and control of patient-

perceived service quality and attach importance to brand management to improve the loyalty of inpatients (pp. 4-6).

In "Research Progress on Factors Influencing Patient Loyalty" , Wang and Xiong (2014) pointed out that customer loyalty has become an important indicator for measuring hospital competitiveness. With the improvement of quality of life, people's expectations for medical services are increasing , which has prompted China's medical and health reform to continue to deepen and the hospital management system is also constantly changing. Surveys show that the improvement of customer loyalty can greatly promote the development of enterprises. There fore , it is very important for hospitals to improve patient loyalty in order to seek deeper quality (pp. 28-30).

"Analysis of Factors Affecting Patient Loyalty and Suggestions for Improving Patient Loyalty" was written by Wang and Xu (2014, pp. 90-91). It analyzed the factors that affect patient loyalty and put forward opinions and suggestions on how to improve patient loyalty. The study believes that with the intensification of competition in the medical market , the management concept of customer loyalty has gradually received attention and research from hospitals. Therefore, hospitals should pay attention to the factors that affect patient loyalty and take corresponding measures to improve patient loyalty.

Through the review and analysis of relevant literature, it is known that inpatient loyalty and its influencing factors are crucial to providing high-quality medical services. The results show that there are various factors affecting inpatient loyalty, including diagnosis and treatment level, medical expenses, hospital brand, medical environment,etc. In order to improve patient loyalty, hospitals should strengthen the management and control of patient-perceived service quality and pay attention to brand management. In addition, hospitals should also pay attention to patients' willingness to recommend, improve diagnosis and treatment level and treatment effect, so as to increase the possibility of patients recommending to others. These studies provide important reference and guidance for hospitals, helping them to provide higher quality medical services and improve patient loyalty.

Wang and Xu (2014) analyzed the factors that affect patient loyalty in the article "Analysis of Factors Affecting Patient Loyalty and Suggestions for Improving Patient Loyalty", and put forward opinions and suggestions on improving patient loyalty. The results of the study show that with the intensification of competition in the medical market, the management concept of patient loyalty has gradually been taken seriously by hospitals. The authors pointed out that improving patient loyalty requires attention to factors such as the hospital's service attitude, the medical technology

level of medical staff, medical expenses, and the hospitalization environment, and put forward corresponding suggestions (pp. 90-91).

2.4 Patient satisfaction

Patient satisfaction is an indispensable indicator for evaluating the quality of medical services, reflecting the degree of fit between patients' needs and actual medical care experience (Press, 2002). With the development of the "patient-centered" medical service concept, patient satisfaction has become a core factor in evaluating the service quality of medical institutions (Otani, Waterman, & Dunagan, 2012, p.276-293). “Satisfaction not only represents the patient's subjective evaluation of medical quality, but also reflects the actual improvement of health outcomes obtained by patients in the process of medical services” (Andaleeb, 2001, pp. 1359-1370). Studies have shown that patient satisfaction is closely related to the quality of medical services. Many countries have taken it as a key indicator for controlling the quality of medical services and included it in the performance evaluation system of medical institutions (Bleich, Özaltin, & Murray, 2009, pp. 271-278).

Patient satisfaction is the expansion and extension of customer satisfaction in the medical field. It is the patient's perception of the demand for medical care services and the actual experience. Patient satisfaction has become the main basis for measuring the quality of medical services and is the core part of the hospital rating system. The Action Plan for Further Improving Medical Services (2018-2020) clearly states that satisfaction evaluation should be included in the comprehensive performance assessment of medical and health institutions to ensure the continuous improvement of medical service quality.

Patient satisfaction refers to the comprehensive evaluation of the medical services received by people based on their understanding of health, their economic conditions, and their requirements for medical care. The quality of medical services refers to the degree to which patients' expected results are increased through the medical service process under existing conditions using medical knowledge and technology: restoring physical and mental health and satisfaction, and reducing undesirable results. It can be seen that improving patient satisfaction is the ultimate goal of improving the quality of medical services. Many countries attach great importance to the evaluation of patient satisfaction in the activities of improving medical quality. Some European and American countries even regard patient satisfaction as one of the six models of medical assurance. It is believed that patient satisfaction surveys are gradually becoming an irreplaceable method in comprehensive

medical quality control.

Ge, Ding, and Shi (2009) analyzed the factors affecting patients' evaluation of satisfaction with medical services in "Analysis of Inpatient Satisfaction Survey" . The study used a cross-sectional satisfaction survey and face-to-face interviews to analyze patient satisfaction. The results showed that there is ambiguity in patient satisfaction, which can easily generate erroneous satisfaction rates. Factors affecting patients' evaluation of satisfaction with hospital services include service attitude, medical technology level of medical staff, medical expenses, hospitalization environment, etc. The authors pointed out that reliable medical technology and good service attitude are the two most important factors affecting patients' evaluation of satisfaction with hospital services (pp. 245-247) .

In the article "Preparation and Evaluation of a Simple Questionnaire for Patient Satisfaction Survey on Hospitalization" , Sun et al. (2014) prepared a simple questionnaire suitable for patients to evaluate their satisfaction with their hospitalization experience and evaluated its reliability and validity. The results showed that the simple questionnaire had good test-retest reliability, construct validity, and criterion validity (pp. 77-80). The questionnaire covered seven items, including hospitalization procedures, medical technology, service attitude, pain management, patient participation , environment , and comprehensive evaluation , and can be used to evaluate the satisfaction of hospitalized patients with medical services. Yuan (2007) , in "Adjustment Countermeasures to Improve Hospitalized Patients' Satisfaction with Nurse-Patient Communication" , discussed the reasons why hospitalized patients were dissatisfied with nurse-patient communication and proposed countermeasures to improve patients' satisfaction with nurse-patient communication (p. 63). The results showed that when nurses communicated with patients , patients were blunt and impolite in their language and wanted to be addressed by age. The author suggested improving nurses' communication skills and using polite titles to improve patients' satisfaction with nurse-patient communication. Mao et al. (2021) believed that the overall satisfaction of inpatients in Tibet in 2018 was high (88.5%) , and the satisfaction was mainly affected by factors such as the clarity of medical staff's explanations, ward environment , cost , self-assessment of health , listening seriously, institution type, and attitude of medical staff (pp. 2006-2013). Ma et al. (2024) believed in "Qualitative Study on Factors Influencing Satisfaction of Inpatient Nursing Services in Public Hospitals" that the satisfaction of inpatients was affected by multiple factors such as service attitude, technical level, and timeliness of service. The improvement strategies proposed included improving nursing attitude and technology, shortening waiting time ,

deepening quality care, strengthening logistics management, practicing caring communication , and multicultural care (pp. 160-164).

Jin, Wu, and Tao (2020) proposed in "Research Progress on Factors Influencing Inpatient Satisfaction" that inpatient satisfaction is affected by multiple factors such as patient health, nursing, and medical institution environment. The diversified reasons need to be studied in depth to help hospitals accurately improve services (pp. 227-229).

Huang, Lin, and Huang (2019) believed that the nursing satisfaction of inpatients in the orthopedic department was affected by age, education level, number of days in bed , and length of hospital stay , among which age and number of days in bed were independent influencing factors , and proposed that the quality of nursing should be improved in light of these factors (pp. 371-373). Yao (2020) believed in the "Study on Satisfaction of Inpatients in Hospitals and Its Influencing Factors" that improving patient satisfaction is an important task for hospital operations . Through a survey of a tertiary hospital in Henan Province , it was pointed out that factors such as medical technology and service attitude significantly affect satisfaction , and suggestions for improvement were proposed , such as strengthening service awareness , improving technology , and optimizing communication. Yang, Cai, and Zhang (2020) proposed in their study that the satisfaction of inpatients in a tertiary hospital in Beijing was high, but the satisfaction in the dimensions of medical communication, medication communication , and sense of responsibility needed to be improved . It is recommended to strengthen medical training , optimize medical treatment processes , reduce waiting time , and improve meal services (pp. 290-296) . Yang and Wang (2021) pointed out in "Analysis of Patient Satisfaction and Influencing Factors of Oral and Maxillofacial Surgery Inpatients" that the overall patient satisfaction is high , but the nurses' skills , attitudes and sense of responsibility are the main factors affecting satisfaction. It is recommended to improve the professional skills and communication attitudes of nurses to further improve patient satisfaction (pp. 2568-2572).

Cao et al. (2020) proposed in the "Analysis of Influencing Factors and Improvement Strategies of Dietary Satisfaction of Inpatients" that dietary variety, hygiene, and dietary quality are the main factors affecting inpatient dietary satisfaction, and believe that actively improving these aspects can significantly improve patient satisfaction (pp.1511-1513). Zhang and Yang (2020) believed that the satisfaction of inpatients in a public hospital in Xuzhou was significantly affected by the medical environment , medical ethics, and medical expenses. They proposed measures such

as reducing the burden of medical treatment , strengthening the publicity of medical insurance policies, and improving the referral system to improve satisfaction and promote the development of medical health (pp. 52-57).

Zhang, Chen, Yi, Zhang, and Zhang (2021) believed in "Satisfaction of inpatients in tertiary general hospitals in Zhengzhou based on medical experience and its influencing factors" that the overall satisfaction of inpatients in tertiary general hospitals in Zhengzhou is high, but emotional support and disease communication experience need to be improved (pp. 18-21). Hospitals need to pay attention to non-technical services such as humanistic care , communication , and environmental logistics to improve patient satisfaction. Dang, Li , Ma , Zhang , and Tang (2022) believed in "Analysis of Satisfaction of Inpatients with Medical Services and Influencing Factors" that the satisfaction of inpatients in Ningxia is affected by age , clarity of treatment plan explanation , trust in medical staff , and medical cost evaluation (pp. 53-57). It is recommended to improve care , doctors' humanistic literacy , and control medical costs to improve satisfaction and service quality. Dai , Gu , and Xu (2019) pointed out in "Analysis of Satisfaction of Inpatients with Medical Services and Influencing Factors - Based on the Sixth Health Service Survey Data of Jiangsu Province" that the overall satisfaction of inpatients in Jiangsu Province is 76%, and ward environment , attitude of medical staff , and clarity of treatment explanation are the main factors affecting satisfaction (pp. 41-43). It is recommended that hospitals improve service quality, the government reduce medical burdens and increase the proportion of medical insurance reimbursement to improve satisfaction . Mei , Zhou , Li , and Mao (2023) believed in "A study on the influencing factors of clinical pharmacist service satisfaction from the perspective of inpatients-based factor analysis and multivariate linear regression analysis" that clinical pharmacist service skills are the primary factor in improving patient satisfaction , and service efficiency is relatively low (pp. 773-777). It is proposed that improving the work enthusiasm and professional quality of clinical pharmacists is the key to improving clinical pharmacy services .

Li and Liu (2008) studied the factors influencing patient satisfaction through questionnaire surveys. Patient satisfaction is most closely related to treatment effect , and is also highly positively correlated with doctor-patient communication and the service attitude of medical staff , but not significantly correlated with treatment costs . Patients tend to pay higher prices to obtain high-quality medical services . There is also a significant positive correlation between doctor-patient communication, the service attitude of medical staff and treatment effect. Therefore, to improve patient satisfaction , hospitals must first improve their medical level , and secondly strengthen

the communication skills of medical staff and the cultivation of their service awareness . Medical charges need to be regulated by a third party, namely the government regulatory department , in order to be rationalized (p. 321) .

Foreign scholars generally believe that inpatient satisfaction is a multi-dimensional concept involving medical service quality, attitude of medical staff, hospital environment and facilities, waiting time , service results , etc. A US study pointed out that patients are most satisfied with the medical process , followed by the service attitude of medical staff, while satisfaction with waiting time and hospital environment and facilities is relatively low. This shows that improving medical service efficiency and improving the medical environment are the key to improving patient satisfaction .

2.5 The relationship between recommendation, satisfaction and loyalty

MacStravic (1995) believes that loyal patients are willing to recommend relatives and friends to their favorite doctors, provide valuable information and opinions , and are willing to pay more medical expenses (pp. 51-61). Therefore , loyal customers can improve the operating performance of enterprises . MacStravic (1994) proposed that the loyalty of loyal customers has multiple values and utilities for medical institutions, and the multiple benefits of the extended patient role extend their value to 2-3 times that of the original customers (pp. 67-72). Reichheld and Sasser (1990) pointed out that if an enterprise can reduce the customer default loss rate by 5% , it can increase profits by 25-85% (pp. 105-111).

Weng, He, Qiu, and Huang (2004) pointed out that when the patient's perceived relationship quality is higher, the loyalty to the medical service provider is higher (pp. 418-435). Weng et al. (2004) pointed out that the relationship benefits between patients and doctors will positively affect the loyalty of doctors and hospitals. Lin (2004) proposed that in order to establish patient loyalty in the medical industry , different marketing strategies can attract patients' attention. The effectiveness of the initial medical treatment , the service process , and the attitude of the staff will affect the patient's willingness to return for a visit and continue to seek medical treatment. Zhu (1995) mentioned in their research that complete medical equipment, recommendations from relatives and friends, excellent medical skills of doctors, convenient transportation, and good service attitude will affect patients' choice of medical institutions.

The research results of Zhong, Zhou, and Guo (2005) show that after controlling for factors such as personal characteristics , the service quality of hospital

websites will affect the website users' intention to seek medical treatment or make recommendations. Therefore , it is recommended that hospital operators should pay attention to the information and services provided by the website and strengthen the relationship with patients through the hospital website as a medium (pp. 375-384).

Customer loyalty is a behavioral expression of customer satisfaction after purchase. When customer loyalty and satisfaction are high, the chances of customers recommending the hospital to friends and family will be higher. Therefore , in terms of hospital satisfaction, the level of satisfaction will affect the patient 's behavioral expression of whether he or she will seek medical treatment again in the future. The more loyal patients are , the more willing they are to return for treatment and recommend the hospital to friends and family , and the more benefits the medical institution will receive.Highly satisfied patients are often willing to actively recommend the medical institutions they are satisfied with to others. This kind of word-of-mouth communication is of immeasurable value in establishing a good image of the hospital. On the contrary, if the patient experience is ignored, it may lead to the spread of negative reviews and damage the reputation of the hospital.

Gu, Gu, and Zhang (2007) found that: First, 484 out of 503 patients were willing to choose this hospital again, accounting for 96.4% ; 472 patients were willing to recommend their relatives and friends to this hospital for treatment, accounting for 94.0%. Second, the overall patient -centered care experience can effectively predict whether patients will choose to visit this hospital again. Third, the degree of trust in doctors and the overall patient-centered care experience can effectively predict whether patients will recommend their relatives and friends to visit this hospital. The results of this study found that the care experience provided by the hospital to patients is an important factor affecting patients' medical loyalty. Therefore, hospitals can strengthen the care and information sharing of medical staff to patients in the future to improve patient satisfaction and maintain or improve medical loyalty (p.36) .

2.6 Online reviews

Online reviews are of great significance in the medical field. First, they provide a platform for patients to share their medical experiences so that other patients can benefit from the experiences of others. They help to build a community where patients can exchange information about doctors , hospitals , and treatments. Second, online reviews related to healthcare guide patients in choosing healthcare providers. By understanding the satisfaction and dissatisfaction of other patients, one

can make a more informed choice of a doctor or healthcare provider that suits one's needs. In addition , these reviews provide a feedback channel for medical practitioners to understand how patients feel about their services. This helps medical institutions and practitioners improve the quality of their services and increase patient satisfaction.

Gao, Liu, and Yang (2019) conducted an in-depth study on the use of topic models to mine medical service topics. In view of the problems of semantic sparsity and insufficient co-occurrence information in the use of LDA topic models for medical review topic mining, a CO-LDA model based on word co-occurrence analysis and LDA topic model was proposed. First, the comment corpus was analyzed using the word co-occurrence analysis method to obtain the word co-occurrence matrix. Secondly, the LDA topic model was used to model the corpus comments and mine the patients' concerns about medical services. The application effects of the CO-LDA model and the traditional LDA model in medical review topic mining were compared based on the average minimum JS distance, the average Kendall rank correlation coefficient τb , and the average TF-IDF. The experiment finally showed that the consistency and topic quality of the CO-LDA model in identifying topics were better than those of the LDA model. The experimental results were compared with the Chinese "Hospital Evaluation Standards" , and the consistency was high , indicating the effectiveness of the online medical review topic mining method based on CO-LDA (pp. 427-434).

A text mining approach based on SentiNet and LDA revealed latent topics for high-risk and low-risk disease categories, revealing new insights into what patients value and dislike when consulting their doctors (Shah, Yan, Tariq, & Ali, 2021, pp. 1-17).

Zhai Song, Chen, and Lu (2022) Although there have been studies on the topic analysis and satisfaction of online reviews in the health field , for example , Zhai Yunkai used text mining to index and extract online reviews and perform satisfaction analysis, quantitatively evaluating user satisfaction with mHealth applications , confirming that users are satisfied with the quality of mHealth application services and content, but less satisfied with the quality of management and technology . Machine learning was used to perform topic modeling and opinion mining on user-generated content of postpartum care centers on the Internet. However, patients with chronic diseases who require frequent medical care cannot obtain high-quality care in this regard. Our study started with patients with chronic diseases because they are different from other diseases. Based on the characteristics of the large number of patients with chronic diseases, long disease cycles, and difficulty in curing, hospitals must optimize medical processes , improve service efficiency, and better treat patients with chronic diseases (pp. 1-19).

2.7 Service quality and patient satisfaction

Kuo , Wu , Hsu , and Chen (2011) suggested that planning and implementing service strategies can improve patient satisfaction, further proving the relationship between service quality and patient satisfaction (pp. e209-e217). In a study of 385 dental patients in Thailand , i (Siripipatthanakul & Vui, 2021) studied the significant impact of service quality on patient satisfaction (pp. 1-17).

Aliman and Mohamad (2016) highlighted the positive impact of service quality on patient satisfaction. According to the study, healthcare providers must improve their business knowledge and service capabilities to improve their response to patient needs , thereby improving service quality and patient satisfaction (pp.141-148). Lin and Yin (2022) confirmed the relationship between dental clinic service quality and patient satisfaction. Several areas that dental care providers need to improve were identified in this study, which improved appointment time and convenience(pp. 1-9).

Eren , Usul , An , and Özkan (2020) believe that healthcare providers must achieve high quality of service. In this way, patient satisfaction can be achieved. Although the improvement of service quality will lead to higher costs in the short term , the impact of patient satisfaction will be more valuable over time (pp.482-496).

2.8 Service quality and patient loyalty

Studies have shown that improved service quality leads to increased patient loyalty, highlighting the impact of service quality on patient loyalty (Zarei, Arab, Froushani, Rashidian, & Tabatabaei, 2012, pp. 1-7). In a Pakistani study , Fatima, Malik, & Shabbir (2018) found that service quality creates patient loyalty in the context of healthcare delivery (pp. 1-30). Hashem and Ali (2019) concluded that patient loyalty can be explained by the quality of the services provided. It is recommended that service quality in the dental field be continuously evaluated to adapt to the changing patient expectations and needs (pp. 1-30) . Sitio and Ali (2019)'s study linked service quality in the healthcare service field to patient loyalty and predicted that improved service quality would lead to increased patient loyalty (pp. 551-559).

The social influence of medical service institutions depends on the number of patients , it is recommended that medical service providers pay close attention to patients' opinions on their quality in order to gain patient satisfaction and thus link service quality with patient loyalty (Siripipatthanakul & Vui, pp. 2021, 1-17).

2.9 Reputation and patient satisfaction

Amarat, Akbolat, and Dizlek (2022) confirmed the positive impact of reputation on patient satisfaction in a study in Turkey (pp. 64-75) . In addition, Suki (2011) conducted a study on healthcare services in Malaysia and found that a good reputation can increase patient satisfaction(pp. 1207-1210). Tan, Ojo, Cheah, and Ramayah (2019) defined hospital brand image as the integration of patients' experience with healthcare providers , reflected in selected issues around reputation and ethical behavio. Therefore, it is appropriate to consider hospital brand image as a proxy for variable reputation. Researchers continue to confirm that hospital brand image largely determines patient satisfaction (pp.129-143).

While describing the variable brand image, argued that its core elements are honesty and fulfillment of promises, therefore it is sufficient to consider hospital brand image as a substitute for variable reputation. The authors went on to determine that this variable has a significant impact on patient satisfaction (Hosseini & Behboudi, 2017, pp. 580-590). Sibarani and Riani (2017) defined variable brand image as encouraging customers to prefer certain products over others. Therefore, variable brand image would be considered a substitute for reputation. In their study, the researchers concluded that hospital image has a significant impact on patient satisfaction (pp.25-42).

2.10 Patient satisfaction and patient loyalty

Amin and Nasharuddin (2013) linked patient satisfaction to the intention to return to a healthcare provider, which can be interpreted as patient loyalty. According to this finding , there is a direct relationship between patient satisfaction and patient loyalty, and working hard to achieve patient satisfaction can build patient loyalty (pp. 238-254).

In addition to this, in a study with similar research objectives, Siripipatthanakul and Vui (2021) highlighted the significant impact of patient satisfaction on patient loyalty in the context of dental care providers in Thailand (1-17). Siripipatthanakul and Vui (2021) further suggested that dental care providers should consider the impact of patient satisfaction on patient loyalty when allocating resources to meet patient needs (pp. 1-17).

A large number of studies have shown that there is a significant positive correlation between patient satisfaction and their loyalty. Oliver and other scholars pointed out that loyalty is not only reflected in repeated purchase behavior, but also includes emotional dependence on brands or services. In the medical field, this

emotional dependence is manifested in patients' trust in specific medical institutions and their willingness to seek medical treatment again. For example, a study in the Arab region found that high-quality medical services can significantly improve patient loyalty and prompt them to continue to choose the medical institution in the future (Zarei et al. 2012, pp. 1-7). Finally, patient satisfaction with medical service personnel and facilities is one of the most important factors in creating patient loyalty.

Patient satisfaction is an interesting topic for healthcare organizations because patients are their real customers. In fact, people who need healthcare are no longer considered patients , but rather customers. As is the case with different other industries , customer (i.e., patient) satisfaction is essential for the business survival of healthcare organizations. On the other hand , customer satisfaction is one of the main goals of all quality management programs. TQM is a necessity for healthcare systems to meet the needs of customers , employees , and other stakeholders . In other words , applying quality management programs in healthcare organizations will bring good results for different stakeholders , especially customers.

It is generally believed that customer satisfaction leads to their loyalty. There is growing evidence that if patients are satisfied with the services provided by the hospital , they are willing to use the service again in the future. Kessler and Mylod believe that there is a positive correlation between patient satisfaction and their loyalty , so the more satisfied they are with the service , the higher their loyalty to the service (Sadeh 2017, pp.101-107).

2.11 Inpatient experience and satisfaction

In the study of the relationship between inpatient experience and satisfaction , loyalty , and recommendation, Huang , Chen , Luo , Li, and Xu (2022) used a questionnaire survey to understand the actual hospitalization situation of inpatients. By constructing a relationship model between patient experience and satisfaction, loyalty, and recommendation, and adding the mediating variable expectation satisfaction , the researchers determined the influence between the variables. The results show that the inpatient experience directly affects the satisfaction and recommendation of hospital services, and indirectly affects satisfaction, loyalty, and recommendation through expectation satisfaction. Therefore, improving patient experience can be used as an important means for hospitals to improve service quality , which has certain practical significance for improving hospital patient satisfaction , forming a good reputation , and establishing a brand image (pp. 42-45).

By reviewing and analyzing the research of Huang Shuanghui et al. in 2022 ,

it was found that there is a direct and indirect relationship between the inpatient experience and satisfaction . These research results provide an important theoretical basis for hospitals to improve service quality and patient satisfaction. However , there are still some shortcomings in the current research , such as the limitations of the research sample and the singleness of the research method. Therefore, future research can further expand the sample size and adopt a variety of research methods to verify and expand this topic in order to provide more comprehensive and accurate research conclusions.

2.12 Medical communication and satisfaction

Doctor-patient communication is a crucial link in medical services and has an important impact on patient satisfaction and loyalty. Therefore, understanding patients' satisfaction with the details of doctor-patient communication can provide effective suggestions for optimizing medical services and improving the quality of doctor-patient communication. In the article "Research on the Satisfaction of Inpatients with the Details of Doctor-Patient Communication" , Shao and Wang (2019) used a self-designed questionnaire to conduct a satisfaction questionnaire survey on inpatients in 10 public hospitals in Jiangsu Province. The survey content mainly included the specific details of doctor-patient communication and patient satisfaction. The purpose is to provide optimized medical services and improve the quality of doctor-patient communication and make suggestions. In terms of the details of doctor-patient communication, medical staff need to continuously improve the quality and effectiveness of doctor-patient communication , use effective and easy-to-understand methods to explain diseases , treatments and costs , and pay attention to listening. Improving communication skills and using polite titles can also improve patient satisfaction. By improving the quality of medical services, patient satisfaction can be further improved. Through this study, it was found that patients were generally satisfied with doctor-patient communication , and there were differences in the details of doctor-patient communication between different departments , surgical and non-surgical patients, and doctors of different titles. The results of the study suggest that doctors need to improve their auxiliary explanations. In summary , this study provides effective suggestions for optimizing medical services and improving the quality of doctor-patient communication. It further explores how to improve the quality and effectiveness of doctor-patient communication to improve patient satisfaction and loyalty (pp. 444-448).

2.13 The moderating effect of recommendations from relatives and friends

In recent years , more and more studies have begun to focus on the moderating role of recommendations from relatives and friends in patient satisfaction and loyalty. Studies have shown that positive recommendations from relatives and friends can enhance patients' trust, thereby improving satisfaction and loyalty with medical services. A survey of Spanish medical institutions found that recommendations from relatives and friends have an important impact on patients' medical decisions and can significantly improve patients' loyalty and satisfaction.

Luan et al. (2019) investigated and evaluated the trust behavior of inpatients in the article "Survey on the Trust Behavior of Inpatients and Analysis of Influencing Factors". They used third-party evaluation to investigate and evaluate the trust behavior of inpatients, and conducted regression analysis on the factors affecting the trust behavior of patients. The results showed that there were significant differences in the scores of patient satisfaction and trust behavior based on age, gender , occupation , education level, marital status , medical insurance form , monthly income , and health status. In addition , the third-party trust evaluation score was lower than the hospital's self-evaluation of trust. Age , gender , education level , marital status , medical insurance form, monthly income, health status, and satisfaction were the main factors affecting the trust behavior of inpatients . At the same time , reliable medical technology and good service attitude were the two most important factors affecting patients' evaluation of hospital service satisfaction. In addition , improving nurses' communication skills and using polite titles can also improve patients ' satisfaction with nurse-patient communication (pp. 409-412).

2.14 Related research results

Social influence , particularly recommendations from relatives and friends, has emerged as a significant factor in healthcare decision-making. Word-of-mouth (WOM) is often more trusted than formal marketing due to its personal and experiential nature. Kotler and Keller (2016) argue that WOM shapes consumer expectations, which in healthcare can influence both satisfaction and loyalty. Leisen and Hyman (2004) found that positive recommendations from family increased patients’ pre-service expectations in U.S. hospitals, affecting their subsequent satisfaction when those expectations were met.

The moderating role of recommendations has been explored in related fields. In a study of hotel services , Kim , Han , and Lee (2001) showed that WOM moderated the relationship between service quality and loyalty , amplifying loyalty

when recommendations reinforced positive experiences. This study will help hotel managers design guidelines for efficient relationship marketing activities. The effective use of relationship marketing strategies can increase repeat guests and positive word of mouth. To analyze data collected from 27 luxury hotels in Seoul , South Korea , structural equation modeling was used to discover a causal relationship. The empirical results of this study are twofold : Greater guest confidence and communication result in higher relationship quality , and higher relationship quality results in greater guest commitment and more repeat purchase and positive word of mouth.

Translating this to healthcare , Fatima, Malik, and Shabbir (2018) suggested that friends' or relatives' endorsements could heighten the impact of Empathy on satisfaction, as patients may prioritize emotional care when it aligns with others' stories. Conversely, Lee et al. (2010) noted a potential contrast effect : if recommendations oversell a hospital's capabilities (e.g., exaggerated Assurance) , dissatisfaction may increase when perceptions fall short, reducing loyalty.

Few studies have explicitly tested the moderating effect of recommendations on the SERVQUAL-satisfaction-loyalty pathway in healthcare, but related evidence offers insights. Purcarea, Gheorghe, and Petrescu (2013) found that in Romanian hospitals , social recommendations amplified the effect of Tangibles on satisfaction , as patients trusted relatives' opinions about visible quality (e.g., cleanliness). Similarly, Chang , Tseng, and Woodside (2013) in Taiwan observed that recommendations strengthened the link between Responsiveness and loyalty, as timely service validated family endorsements , reinforcing trust.

The buffering effect of recommendations is also noted. Zainol, Ahmad , and Usman (2016) reported that in Malaysian private hospitals, positive WOM mitigated dissatisfaction from minor service failures (e.g., delays) , suggesting a protective role in sustaining loyalty. This aligns with Arndt (1967) early work on WOM , which posits that trusted sources can offset negative experiences by reframing perceptions.

Despite these findings, gaps remain. Most studies apply SERVQUAL descriptively rather than testing moderating effects like recommendations. The healthcare context also lacks robust evidence on how specific SERVQUAL dimensions interact with social influence. For example, does Assurance (staff competence) matter more when recommended by a trusted relative with medical experience? Additionally, cultural differences—such as collectivism in Asian contexts vs. individualism in Western

ones—may alter the weight of recommendations, an area underexplored in inpatient settings (Hofstede, 2001)[1].

Chapter 3
Research Methodology

3.1 Population and samples used in the study

3.1.1 Population used in the study

The target population of the study is inpatients, specifically patients who receive inpatient treatment in a tertiary hospital in Shanxi Province , China. The study aims to explore the influencing factors of inpatients' perception of medical service quality, satisfaction and loyalty, with special attention to the moderating role of recommendations from relatives and friends. Therefore, the study population is limited to inpatients who can provide feedback on their medical experience and meet specific inclusion criteria.

3.1.2 Inclusion criteria:

Age : 18 years and above.

Health status: No intellectual or mental disorders, able to understand and answer questionnaire questions.

Consent to participate: Informed consent and voluntary participation in the study.

Study time and location:

Time: Sample data collection time is from January 2024 to May 2024.

Location: A tertiary hospital in Shanxi Province, covering major departments including nephrology, gastroenterology, cardiology and neurology.

3.1.3 Study sample

A total of 415 valid questionnaires were collected in the study, and the sample size met the recommendation of DeVellis and Thorpe (2021)[1] on the sample size of questionnaire testing, that is, the ratio of the number of questions to the number of samples should be between 1: 5 and 1: 10. The following are the specific characteristics of the sample:

Number of samples:

Total number of valid questionnaires: 415.

Gender distribution:

Male: 202 people, accounting for 48.675%.

Female: 213 people, accounting for 51.325%.

Age distribution:

Under 20 years old: 5 people, accounting for 1.205%.

20-29 years old: 34 people, accounting for 8.193%.

30-39 years old: 67 people, accounting for 16.145%.

40-49 years old: 97 people, accounting for 23.373%.

50-59 years old: 105 people, accounting for 25.301%.

60 years old and above: 107 people, accounting for 25.783%.

Education level distribution:

Junior high school and below: 142 people, accounting for 34.217%.

High school or technical secondary school: 112 people, accounting for 26.988%.

Undergraduate or junior college: 147 people, accounting for 35.422%.

Postgraduate: 14 people, accounting for 3.373%.

Payment method distribution:

Personal payment: 34 people, accounting for 8.193%.

Provincial medical insurance: 110 people, accounting for 26.506%.

Municipal medical insurance: 127 people, accounting for 30.602%.

New rural cooperative medical insurance: 144 people, accounting for 34.699%.

Sample selection process:

Time period: The questionnaire survey was conducted from May 9, 2024 to May 14, 2024.

Method: The questionnaire survey method was used to select eligible inpatients from the main departments of the above-mentioned hospitals.

Sample representativeness: The sample covers patients of different genders, ages, education levels and payment methods, with a certain degree of diversity, which can reflect the overall characteristics of inpatients in tertiary hospitals in Shanxi Province.

3.2 Data analysis tools

The study used the following software and statistical methods to process the questionnaire data to ensure the scientificity and rigor of the analysis :

3.2.1 SPSS 26.0

Purpose : used for descriptive statistics, reliability analysis (Cronbach's α), correlation analysis (Pearson correlation coefficient) and preliminary data processing.

Specific application:

Calculate the mean, standard deviation, skewness and kurtosis of each variable.

Test the internal consistency of the scale (Cronbach's α coefficient is >0.8).

Analyze the correlation between variables.

3.2.2 AMOS 24.0

Purpose: used for confirmatory factor analysis (CFA) and structural equation model (SEM) to test research hypotheses and model fit.

Specific application :

Verify the convergent validity and discriminant validity of the scale.

Construct and test the path relationship between service quality, recommendation, satisfaction and loyalty.

Use maximum likelihood estimation to estimate model parameters.

Test the mediation effect by Bootstrap method.

3.2.3 Statistical methods

Descriptive statistics: Analyze sample characteristics (such as gender and age distribution).

Reliability analysis: Ensure the stability of the scale (Cronbach's α > 0.8).

Validity analysis: Includes KMO test (0.974) and Bartlett sphericity test ($p<0.05$).

Correlation analysis: Verify the linear relationship between variables.

Structural equation model (SEM): Test the hypothesis path (such as H1-H5).

Mediation and moderation effect analysis: Evaluate the role of recommendations from relatives and friends.

Reliability and validity of the tool

Reliability: The Cronbach's α coefficients of all scales are between 0.886 and 0.985, indicating that the tool has a high internal consistency (see Table 4.7).

Validity: Includes KMO test (0.974) and Bartlett sphericity test ($p<0.05$).

Convergent validity: AVE values are all > 0.5, and CR values are all > 0.7 (see Table 4.11).

Discriminant validity: The AVE square root of some variables is less

than the maximum value of the correlation coefficient, indicating that the discriminant validity is weak (see Table 4.12).

Structural validity: The KMO value is 0.974, which is suitable for factor analysis (see Table 4.8).

Data Collection Overview:

The study collected data through a questionnaire survey method, aiming to obtain inpatients' perception of medical service quality, satisfaction, loyalty, and the impact of recommendations from relatives and friends. The data collection process strictly follows the principle of scientific sampling to ensure the representativeness of the sample and the validity of the data. The following are the specific details of data collection:

3.3 Data Collection

3.3.1 Time and place of data collection

Time :

The data collection covers January 2024 to May 2024 , and the specific questionnaire distribution and collection time is from May 9, 2024 to May 14, 2024.

Location:

The data comes from a tertiary hospital in Shanxi Province, China, and the main departments involved include nephrology, gastroenterology, cardiology, and neurology.

3.3.2 Objects of data collection

Target population: inpatients.

Inclusion criteria:

Age 18 years and above.

No intellectual or mental disorders, able to understand and answer questionnaire questions.

Informed consent and voluntary participation in the study.

Sample size:

A total of 415 valid questionnaires were collected.

Gender distribution: 202 males (48.675%) , 213 females (51.325%).

3.3.3 Data collection tools

Tools: Self-compiled questionnaire, designed based on the SERVQUAL mode, including the following scales:

Medical service quality scale: measures tangibility, reliability, responsiveness, assurance, and empathy.

Patient loyalty scale: measures willingness to seek medical treatment again, word-of-mouth publicity, and loyalty behavior.

Service satisfaction scale: measures waiting time, medical communication, and treatment effect.

Recommendation effect scale: measures word-of-mouth, social media, recommendations from relatives and friends, online reviews, professional recommendation, and media reports.

Basic information: Demographic information such as gender, age, education level, and payment method was collected.

Grading method: Use Likert five-level scale (1=strongly disagree, 5=strongly agree).

3.3.4 Data collection method

Method: Questionnaire survey method.

Implementation process:

Questionnaire design:

The questionnaire was developed based on literature review and SERVQUAL model, and was reviewed and pre-tested by experts to ensure that the questions were clear and consistent with the research objectives.

Sample selection:

Eligible participants were randomly selected from patients hospitalized in the target hospital from January to May 2024.

Major departments such as nephrology, gastroenterology, cardiology and neurology were covered to ensure the diversity of the sample.

Questionnaire distribution:

Paper questionnaires were distributed on-site in the hospital by researchers or trained investigators between May 9 and May 14, 2024.

The purpose of the study was explained to the patients, and after obtaining informed consent, the patients filled in the questionnaires themselves.

Questionnaire collection:

Questionnaires were collected on-site to check completeness and ensure data availability.

Questionnaires that were incomplete or did not meet the inclusion criteria were eliminated, and 415 valid questionnaires were retained.

3.3.5 Sample characteristics of data collection

According to the frequency analysis results of Chapter 4 "4.3.4 Descriptive Statistics" (Table 4.13) , the sample characteristics are as follows:

Gender:

Male: 202 people (48.675%).

Female: 213 people (51.325%).

Age:

Under 20 years old: 5 people (1.205%).

20-29 years old: 34 people (8.193%).

30-39 years old: 67 people (16.145%).

40-49 years old: 97 people (23.373%).

50-59 years old: 105 people (25.301%).

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Payment method:

Personal payment: 34 people (8.193%).

Provincial medical insurance: 110 people (26.506%).

Municipal medical insurance: 127 people (30.602%).

New rural cooperative medical insurance: 144 people (34.699%).

3.3.6 Quality control of data collection

Sample size basis:

The study refers to the suggestions of DeVellis and Thorpe (2021)[2] , and the ratio of the number of questionnaire questions to the sample size should be 1:5 to 1:10. The questionnaire of this study contains questions of multiple dimensions, and 415 samples meet the needs of statistical analysis.

Reliability and validity:

Reliability: Cronbach's α coefficients were between 0.886 and 0.985, indicating that the questionnaires had high consistency (see Table 4.7).

Validity: KMO value was 0.974, Bartlett's sphericity test $p<0.05$, indicating that the data were suitable for factor analysis (see Table 4.8).

Data cleaning:

Invalid questionnaires (such as missing answers or questionnaires that did not meet the inclusion criteria) were eliminated to ensure data integrity and accuracy.

3.3.7 Post-data collection processing

Data entry: The collected paper questionnaire data were entered into a spreadsheet and then imported into SPSS 26.0 for preliminary processing.

Analysis tools:

SPSS 26.0: used for descriptive statistics, reliability analysis and correlation analysis.

AMOS 24.0: used for confirmatory factor analysis and structural equation model analysis.

Subsequent steps: Use statistical methods (such as SEM and Bootstrap) to verify the research hypothesis and analyze the relationship between service quality, satisfaction, loyalty and recommendation by relatives and friends.

3.4 Data analysis and interpretation

Explanation of data analysis results

3.4.1 The impact of service quality on satisfaction and loyalty

Analysis: Service quality significantly affects patient satisfaction through five dimensions such as tangibility and reliability (path coefficient 0.394), and indirectly affects loyalty through satisfaction (path coefficient 0.965).

Explanation: High-quality medical services (such as modern facilities and timely response) can improve patient satisfaction, and satisfied patients are more likely to seek medical treatment again or recommend hospitals, which is consistent with the research of Zeithaml et al.

3.4.2 The moderating and mediating role of recommendation by relatives and friends

Analysis: Service quality indirectly affects satisfaction through recommendation (indirect effect 0.723), and recommendation directly and positively affects satisfaction (path coefficient 0.623).

Explanation: As a social influencing factor, recommendation by relatives and friends enhances patients' trust in service quality and reduces selection risk, thereby improving satisfaction and loyalty. This verifies the innovation of the study,

that is, the unique role of recommendation by relatives and friends in medical services.

3.4.3 Direct relationship between satisfaction and loyalty

Analysis: Satisfaction has the strongest impact on loyalty (path coefficient 0.965), and is the key driver of loyalty.

Explanation: Satisfied patients are more likely to show loyal behaviors (such as returning to the doctor or word-of-mouth publicity), which is consistent with the conclusion of Bowen and Chen (2001), emphasizing the importance of emotional connection to loyalty (pp. 213–217).

3.4.4 Low-scoring dimensions: tangibility and reliability

Analysis: Although overall satisfaction is high, the scores in tangibility (such as facilities) and reliability (such as service commitment) are low.

Explanation: The actual experience of patients with hospital environment and efficiency did not fully meet their expectations, which may be the reason for low loyalty, suggesting that hospitals need to optimize hardware facilities and service processes.

3.4.5 Applicability of the model

Analysis: The SEM model has a good fit, which verifies the applicability of the SERVQUAL model in medical services.

Explanation: The service quality gap model can effectively analyze patient satisfaction and provide a theoretical basis for hospital management, but the weak discriminant validity may affect the accuracy of the results.

Chapter 4
Research Results

4.1 Symbols used in data analysis

Table 4.1 Statistical tests and symbols in descriptive statistics

symbol	meaning	Usage scenarios
N	Sample size	Indicates the total sample size, for example N=415 (number of valid questionnaires), see Table 4.13 “Frequency Analysis”.
M	Mean	It represents the average score of the variable, such as the mean of each dimension of service quality, see descriptive statistics results.
SD	Standard Deviation	Indicates the degree of dispersion of data , such as the SD value of satisfaction, see descriptive statistical results.
%	percentage	It represents the distribution ratio of sample characteristics, for example, males account for 48.675%, see Table 4.13 “Frequency Analysis”.
χ^2	Chi-square	Used for model fit test, for example , χ^2=1661.326 (see Table 4.9 “Measurement model fit”).
df	Degrees of Freedom	Represents the model degrees of freedom, for example df=338, see Table 4.15 and Table 4.9 “Model Fit”.
χ^2/df	Chi-square value to degrees of freedom ratio	To measure the model fit, <3 is acceptable, for example, χ^2/df=4.910 (see Table 4.9).

Table 4.2 Symbols in reliability and validity analysis

symbol	meaning	Usage scenarios
α	Cronbach's alpha coefficient	It indicates the reliability of the scale, for example, α=0.886 (tangibility), see Table 4.7 "Reliability Analysis".
KMO	Kaiser-Meyer-Olkin value	The measurement data are suitable for factor analysis, ranging from 0 to 1, for example, KMO=0.974 (see Table 4.8).
p	Significance level (p-value)	Indicates statistical significance, such as $p < 0.05$ or $p = 0$, see Table 4.8 "Bartlett's Test of Sphericity".
AVE	Average Variance Extracted	To measure convergent validity, for example, AVE = 0.678 (tangibility), see Table 4.11 "Convergent Validity Analysis".
CR	Composite Reliability	The consistency of the scale was measured, for example, CR=0.894 (tangibility), see Table 4.11"Convergent Validity Analysis".
√AVE	Square root of AVE	For discriminant validity comparison, for example, √AVE=0.823 (tangibility), see Table 4.12 "Discriminant Validity Analysis".

Table 4.3 Symbols in Correlation Analysis

symbol	meaning	Usage scenarios
r	Pearson correlation coefficient	It indicates the correlation between variables, for example, r=0.664 (tangibility and reliability), see Table 4.14 "Correlation Analysis".
*** **	Significant Mark	Indicates the significance of the correlation coefficient, such as ** ($p < 0.01$), see Table 4.14.

Table 4.4 Notation in Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM)

symbol	meaning	Usage scenarios
λ	Factor Loading	It indicates the relationship between the measured variable and the latent variable, for example, λ=0.76 (tangibility question 1), see Table 4.10 “Factor loadings”.
β	Standardized Path Coefficient	It indicates the strength of the causal relationship between variables , for example, β=0.921 (service quality ⟶ recommendation), see Table 4.16 “Path Analysis”.
SE	Standard Error	It represents the error of the estimated value, for example, SE=0.045 (service quality ⟶ satisfaction) , see Table 4.16.
t	t-value	Used to test the significance of the path, for example, t = 29.788 (satisfaction ⟶ loyalty), see Table 4.16.
GFI	Goodness of Fit Index	To measure the overall fit of the model, for example, GFI=0.853 (see Table 4.15 “Structural Model Fit”).
CFI	Comparative Fit Index	To measure the relative fit of the model, for example, CFI=0.963 (see Table 4.15).
RMSEA	Root Mean Square Error of Approximation	Measuring model error, for example , RMSEA=0.101 (see Table 4.15).
RMR	Root Mean Square Residual	Measure the model residual, for example RMR=0.010 (see Table 4.15).

Table 4.5 Notation in Mediation Analysis

symbol	meaning	Usage scenarios
a	Path coefficient from independent variable to mediating variable	For example, quality of service ⟶ recommended path (not directly labeled, but implicit in β=0.921).
b	Path coefficient from mediating variable to dependent variable	For example, the path from recommendation to satisfaction (β=0.623, see Table 4.16).
c	Total effect of independent variable on dependent variable	For example, the total effect of service quality⟶satisfaction (1.221, see Table 4.17 “Mediating Effect”).
c'	Direct effect of independent variable on dependent variable	For example, the direct effect of service quality⟶satisfaction (0.497, see Table 4.17).
ab	Indirect Effect	For example, the indirect effect of service quality on satisfaction through recommendation is 0.723, see Table 4.17.

Table 4.6 Notation in hypothesis testing

symbol	meaning	Usage scenarios
H1-H5	Research hypothesis number	Indicates specific hypotheses, such as H1 : Service quality has a significant positive impact on satisfaction, see Table 4.16 and discussion in Chapter 5.

4.2 Data analysis steps

Step 1: Data collection and preparation

Purpose: To obtain the data required for the study and ensure its availability.

Methods:

Data were collected from inpatients of a tertiary hospital in Shanxi Province through a questionnaire survey from May 9 to May 14, 2024.

The questionnaire included dimensions such as medical service quality, satisfaction, loyalty, and recommendation effect, and was scored using a Likert five-level scale.

The paper questionnaire data was entered into a spreadsheet, and invalid questionnaires (such as missing answers or not meeting the inclusion criteria) were eliminated, and 415 valid samples were finally retained.

Results: 415 valid questionnaires were obtained, and the data were imported into SPSS 26.0 and AMOS 24.0 for subsequent analysis.

Step 2: Descriptive statistical analysis

Purpose: To understand the basic situation of sample characteristics and variable distribution.

Methods:

The frequency and percentage of the sample's demographic characteristics (gender, age, education level, payment method) were calculated using SPSS 26.0.

The mean (M) and standard deviation (SD) of each variable (such as service quality and satisfaction) were calculated.

Results (Table 4.13):

Sample characteristics: 48.675% male, 51.325% female; age is mainly 50-59 years old and above 60 years old (about 25% each); education level is mainly undergraduate or junior college (35.422%) and junior high school and below (34.217%).

Variable distribution: Preliminary statistical data of each dimension is provided to lay the foundation for subsequent analysis.

Step 3: Reliability analysis

Purpose: To test the internal consistency and stability of the questionnaire scale.

Method:

The Cronbach's α coefficient of each scale dimension (such as tangibility, reliability, and satisfaction) was calculated using SPSS 26.0.

Standard: α>0.7 is acceptable, >0.8 is good.

Results (Table 4.7):

The α values of all dimensions are between 0.886 and 0.985, for example, tangibility α=0.886, satisfaction α=0.943, indicating that the scale reliability is extremely high.

Step 4: Validity Analysis

Purpose: To verify the construct validity and measurement accuracy of the scale.

Method:

KMO and Bartlett Sphericity Test:

SPSS 26.0 was used to calculate the KMO value and Bartlett test to evaluate whether the data was suitable for factor analysis.

Standard: KMO>0.6, Bartlett test p<0.05.

Convergent Validity:

AMOS 24.0 was used to calculate the average variance extracted (AVE) and composite reliability (CR).

Standard: AVE>0.5, CR>0.7.

Discriminant Validity:

Compare the square root of AVE with the correlation coefficient between variables.

Standard: The square root of AVE should be greater than the correlation coefficient.

Results:

KMO and Bartlett test (Table 4.8): KMO=0.974 (>0.9), Bartlett test p=0 , the data is very suitable for factor analysis.

Convergent validity (Table 4.11): AVE values are all > 0.5 (such as tangibility AVE = 0.678, CR values are all > 0.7 (such as tangibility CR = 0.894), which meets the standard.

Discriminant validity (Table 4.12): The square root of AVE of some variables is less than the maximum value of the correlation coefficient, and the discriminant validity is weak.

Step 5: Correlation analysis

Purpose: To preliminarily explore the linear relationship between variables and provide a basis for subsequent causal analysis.

Method:

The Pearson correlation coefficient (r) was calculated using SPSS 26.0, and the significance (p value) was tested.

Standard: The r value range is -1 to 1, and $p < 0.05$ indicates a significant correlation.

Results (Table 4.14):

17 variables (such as tangibility, reliability, satisfaction, and loyalty) are all

significantly positively correlated ($p< 0.01$).

Example: Tangibility and reliability $r=0.664$, satisfaction and loyalty behavior $r=0.914$, indicating that the variables are closely related.

Step 6: Confirmatory Factor Analysis (CFA)

Purpose: To verify the structure and factor relationship of the measurement model.

Method:

Use AMOS 24.0 to conduct CFA and analyze the factor loading (λ) and model fit of each latent variable (such as service quality, recommendation).

Fit index standard: $\chi^2/df<3$, RMSEA<0.10, CFI close to or >0.9.

Results:

Factor loading (Table 4.10): Standardized loadings are all >0.6 and significant ($p<0.001$), such as $\lambda=0.760$ for tangibility question 1.

Model fit (Table 4.9): $\chi^2=1661.326$, $df=338$, $\chi^2/df=4.910$, RMSEA=0.097, RMR=0.010, CFI=0.890, the fit is acceptable but not ideal.

Step 7: Structural equation model (SEM) analysis

Purpose: To test the causal relationship between service quality, recommendation, satisfaction and loyalty, and verify the research hypothesis.

Method:

Model construction:

Based on the research framework (Figure 1.1), set the latent variables and path relationship.

Parameter estimation:

The standardized path coefficient (β) was calculated using the maximum likelihood estimation method of AMOS 24.0.

Model test:

The model was evaluated by the fit index and path significance (t value and p value).

Results:

Model fit (Table 4.15): $\chi^2/df=5.203$, GFI=0.853, CFI=0.963, RMSEA=0.101, with good fit.

Path coefficient (Table 4.16):

Service quality⟶recommendation : $\beta=0.921$, $t=20.486$, $p<0.05$.

Recommendation⟶satisfaction: $\beta=0.623$, $t=17.928$, $p<0.05$.

Service quality⟶satisfaction: $\beta=0.394$, $t=10.96$, $p<0.05$.

Satisfaction⟶loyalty: β=0.965, t=29.788, p<0.05.

Hypothesis test: H1-H4 are all established, service quality, recommendation and satisfaction have a significant positive impact on loyalty.

Step 8: Mediating effect analysis

Purpose: To test the mediating role of recommendation between service quality and satisfaction.

Method:

Use the Bootstrap method of AMOS 24.0 (2000 resamplings) to calculate direct effects, indirect effects and total effects.

Judgment criteria: The indirect effect (ab) is significant and the direct effect (c') is still significant for partial mediation; if c' is not significant, it is a complete mediation.

Results (Table 4.17):

Total effect (c): Service quality⟶satisfaction=1.221 (p<0.001).

Direct effect (c'): service quality⟶satisfaction=0.497 (p < 0.001).

Indirect effect (ab): service quality ⟶

recommendation⟶satisfaction=0.723 (p=0.001).

Conclusion: Recommendation plays a partial mediating role (H5 is established), that is, service quality partially affects satisfaction through recommendation.

Logical order of data analysis steps

Data preparation: Ensure data quality and completeness.

Descriptive statistics: Provide a preliminary overview of the sample and variables.

Reliability and validity analysis: Verify the reliability and validity of the measurement tool.

Correlation analysis: Explore the association between variables.

CFA: Confirm the structure of the measurement model.

SEM: Test the causal relationship and hypothesis between variables.

Mediation effect analysis: In-depth analysis of the regulatory mechanism of recommendation.

Summary of results

Reliability and validity: The scale has high reliability (α>0.8), good convergent validity (AVE>0.5, CR>0.7), but weak discriminant validity.

Variable relationship: Service quality significantly affects recommendation and satisfaction, satisfaction strongly drives loyalty, and recommendation plays a

partial mediating role between service quality and satisfaction.

Model applicability: SEM fit is good (CFI=0.963), which verifies the rationality of the research framework.

Summary

The data analysis steps, from data preparation to mediation effect analysis, gradually verify the research hypothesis and show the complex relationship between service quality, recommendation, satisfaction and loyalty. Appropriate statistical tools (SPSS and AMOS) are used at each step to ensure the scientificity and rigor of the analysis.

4.3 Data analysis results

4.3.1 Reliability analysis

Reliability analysis is called reliability analysis, which is a test of the stability, consistency and reliability of the measurement results. In order to ensure the accuracy of the measurement results, the valid data in the questionnaire needs to be analyzed for reliability before analysis. At present, Cronbach's α coefficient is usually used for analysis in social science research. Generally speaking, if the reliability coefficient is above 0.9, it means that the reliability is very good; if it is between 0.8 and 0.9, it means that it is very good; if it is between 0.7 and 0.8, it means that it is good; 0.6 to 0.7, it means that it is acceptable; if it is below 0.6, it means that it needs to be revised.

Table 4.7 Cronbach reliability analysis-simplified format

Dimensions	Number of items	Cronbach alpha coefficient
Tangibility	4	0.886
reliability	3	0.954
Responsiveness	3	0.944
Guarantee	5	0.964
Empathy	7	0.98
Willingness to seek medical treatment again	3	0.975
Word of mouth	3	0.979
Loyalty Behavior	3	0.985
Waiting time	3	0.979

Medical communication	3	0.974
Treatment Effects	3	0.98
Word of mouth	3	0.958
Social Media	3	0.978
Recommended by friends and family	3	0.979
Online reviews	3	0.983
Professional recommendation	3	0.98
Media reports	3	0.982

As can be seen from the above table, the reliability coefficient values are all above 0.8, indicating that the reliability quality of the research data is very good.

4.3.2 Validity analysis

Validity refers to the degree to which the psychological and behavioral characteristics to be measured can be accurately measured through a test or scale tool, that is, the accuracy and reliability of the test results. Generally speaking, the smaller the significance level of the Bartlett sphericity test (P<0.05), the more likely it is that there is a meaningful relationship between the original variables. The KMO value is used to compare the simple correlation and partial correlation coefficients between items, and the value is between 0 and 1. The criteria for suitability for factor analysis are: greater than 0.9, very suitable; 0.7-0.9 is suitable; 0.6-0.7 is relatively suitable; 0.6-0.5 is not very suitable; below 0.5 is abandoned. The Bartlett sphericity test value is used to test whether the correlation coefficient between items is significant. If the significance is less than 0.05, it means that each item is suitable for factor analysis.

Table 4.8 KMO and Bartlett's sphericity test

KMO value		0.974
Bartlett's test of sphericity	Approximate Chi-Square	51126.056
	df	1653
	p-value	0

From the table above, we can see that the KMO value is 0.974, and the KMO value is greater than 0.8. The research data is very suitable for extracting information (which reflects the good validity from the side). P<0.05, each item is suitable for factor analysisn.

4.4.3 Confirmatory factor analysis

4.4.3.1 Model fit Indicators

Table 4.9 Model fitting indicators

Common indicators	Chi-square degrees of freedom ratio χ 2 / df	GFI	RMSEA	RMR	CFI	NFI	TLI
Judgment criteria	<3	>0.9	<0.10	<0.05	>0.9	>0.9	>0.9
value	4.910	0.635	0.097	0.010	0.890	0.867	0.876

4.4.3.2 Factor loadings

Table 4.10 Factor loading table

	Question		Estimte	SE	CR	P	STD Estimte
Q1_Row1	<---	Tangibility	1				0.760
Q1_Row2	<---	Tangibility	1.27 0	0.069	18.441	***	0.866
Q1_Row3	<---	Tangibility	1.437	0.079	18.23 0	***	0.857
Q1_Row4	<---	Tangibility	1.533	0.09 0	17.013	***	0.806
Q2_Row1	<---	reliability	1				0.929
Q2_Row2	<---	reliability	1.111	0.027	40.987	***	0.967
Q2_Row3	<---	reliability	1.202	0.034	34.869	***	0.926
Q3_Row1	<---	Responsiveness	1				0.893
Q3_Row2	<---	Responsiveness	1.2 00	0.037	32.872	***	0.950
Q3_Row3	<---	Responsiveness	1.329	0.042	31.994	***	0.941
Q4_Row1	<---	Guarantee	1				0.854
Q4_Row2	<---	Guarantee	1.056	0.04 0	26.663	***	0.915
Q4_Row3	<---	Guarantee	1.057	0.038	28.173	***	0.939
Q4_Row4	<---	Guarantee	1.063	0.037	28.413	***	0.942
Q4_Row5	<---	Guarantee	1.1 00	0.039	28.239	***	0.94

Q5_Row1	<---	Empathy	1				0.921
Q5_Row2	<---	Empathy	0.979	0.027	36.528	***	0.943
Q5_Row3	<---	Empathy	1.018	0.028	36.653	***	0.944
Q5_Row4	<---	Empathy	1.052	0.029	36.892	***	0.945
Q5_Row5	<---	Empathy	1.008	0.026	38.053	***	0.953
Q5_Row6	<---	Empathy	1.017	0.026	38.665	***	0.957
Q5_Row7	<---	Empathy	1.077	0.035	30.577	***	0.892
Q6_Row1	<---	Willingness to seek medical treatment again	1				0.958
Q6_Row2	<---	Willingness to seek medical treatment again	0.96 0	0.02 0	49.102	***	0.964
Q6_Row3	<---	Willingness to seek medical treatment again	0.994	0.019	51.073	***	0.97 0
Q7_Row1	<---	Word of mouth	1				0.975
Q7_Row2	<---	Word of mouth	1.012	0.017	59.956	***	0.971
Q7_Row3	<---	Word of mouth	1.004	0.018	56.034	***	0.964
Q8_Row1	<---	Loyalty Behavior	1				0.979
Q8_Row2	<---	Loyalty Behavior	0.996	0.016	62.959	***	0.972
Q8_Row3	<---	Loyalty Behavior	1.043	0.015	70.163	***	0.982
Q9_Row1	<---	Waiting time	1				0.968
Q9_Row2	<---	Waiting time	1.025	0.016	62.639	***	0.984
Q9_Row3	<---	Waiting time	0.919	0.018	52.173	***	0.962
Q10_Row1	<---	Medical communication	1				0.969
Q10_Row2	<---	Medical communication	1.024	0.017	59.167	***	0.977
Q10_Row3	<---	Medical communication	1.029	0.022	46.9 00	***	0.946
Q11_Row1	<---	Treatment Effects	1				0.964
Q11_Row2	<---	Treatment Effects	1.021	0.018	55.33 0	***	0.973

Q11_Row3	<---	Treatment Effects	1.001	0.018	56.018	***	0.975
Q12_Row1	<---	Word of mouth	1				0.947
Q12_Row2	<---	Word of mouth	1.003	0.027	37.697	***	0.924
Q12_Row3	<---	Word of mouth	1.064	0.025	42.122	***	0.948
Q13_Row1	<---	Social Media	1				0.959
Q13_Row2	<---	Social Media	0.997	0.018	54.708	***	0.977
Q13_Row3	<---	Social Media	0.995	0.019	52.011	***	0.971
Q14_Row1	<---	Recommended by friends and family	1				0.962
Q14_Row2	<---	Recommended by friends and family	0.987	0.019	51.523	***	0.965
Q14_Row3	<---	Recommended by friends and family	1.047	0.018	58.939	***	0.982
Q15_Row1	<---	Online reviews	1				0.971
Q15_Row2	<---	Online reviews	1.009	0.017	60.408	***	0.976
Q15_Row3	<---	Online reviews	0.987	0.016	63.374	***	0.981
Q16_Row1	<---	Professional recommendation	1				0.961
Q16_Row2	<---	Professional recommendation	1.014	0.019	54.518	***	0.974
Q16_Row3	<---	Professional recommendation	1.009	0.018	54.778	***	0.975
Q17_Row1	<---	Media reports	1				0.973
Q17_Row2	<---	Media reports	1.037	0.016	63.195	***	0.978
Q17_Row3	<---	Media reports	1.024	0.017	58.7 00	***	0.971

From the perspective of measurement relationship: the absolute values of standardized factor loadings of each measurement relationship are all greater than 0.6 and show significance, which means that there is a good measurement relationship.

4.4.3.3 Convergent validity

Table 4.11 Convergent validity

Question	CR	AVE
Tangibility	0.894	0.678
reliability	0.959	0.885
Responsiveness	0.949	0.862
Guarantee	0.964	0.844
Empathy	0.98	0.877
Willingness to seek medical treatment again	0.975	0.929
Word of mouth	0.98	0.941
Loyalty Behavior	0.985	0.956
Waiting time	0.981	0.944
Medical communication	0.975	0.929
Treatment Effects	0.98	0.942
Word of mouth	0.958	0.883
Professional recommendation	0.98	0.941
Social Media	0.979	0.939
Recommended by friends and family	0.98	0.941
Online reviews	0.984	0.952
Media reports	0.982	0.949

A VE values were all greater than 0.5, and the CR values were all higher than 0.7, which means that the data of this analysis have good convergent validity.

4.4.3.4 Discriminant validity

Table 4.12 Discriminant validity

	Tangibility	reliability	Responsiveness	ensure	Empathy	Willingness to seek medical treatment again	Word of mouth	Loyalty Behavior	Waiting time	Medical communication	Treatment Effects	Word of mouth	Professional recommendation	Social Media	Recommended by friends and family	Online reviews	Media reports
Tangibility	0.823																
reliability	0.709***	0.941															
Responsiveness	0.758***	0.909***	0.928														
ensure	0.777***	0.840***	0.882***	0.919													
Empathy	0.726***	0.873***	0.862***	0.908***	0.937												

Willingness to seek medical treatment again	0.766***	0.796***	0.846***	0.897***	0.880***	0.964											
Word of mouth	0.747***	0.828***	0.873***	0.899***	0.891***	0.943***	0.97										
Loyalty Behavior	0.765***	0.807***	0.859***	0.882***	0.888***	0.919***	0.958***	0.978									
Waiting time	0.753***	0.721***	0.809***	0.845***	0.795***	0.821***	0.828***	0.834***	0.971								
Medical communication	0.785***	0.803***	0.844***	0.900***	0.898***	0.910***	0.912***	0.933***	0.854***	0.964							
Treatment Effects	0.762***	0.799***	0.852***	0.912***	0.886***	0.901***	0.909***	0.931***	0.855***	0.943***	0.971						
Word of mouth	0.772***	0.797***	0.845***	0.887***	0.880***	0.883***	0.905***	0.907***	0.891***	0.930***	0.958***	0.94					
Professional recommendation	0.757***	0.761***	0.813***	0.867***	0.836***	0.882***	0.887***	0.895***	0.846***	0.920***	0.932***	0.946***	0.97				
Social Media	0.770***	0.763***	0.823***	0.866***	0.844***	0.874***	0.874***	0.889***	0.881***	0.917***	0.942***	0.980***	0.940***	0.969			
Recommended by friends and family	0.755***	0.786***	0.818***	0.891***	0.874***	0.895***	0.906***	0.914***	0.858***	0.935***	0.963***	0.966***	0.945***	0.956***	0.97		
Online reviews	0.774***	0.744***	0.796***	0.857***	0.834***	0.876***	0.866***	0.870***	0.872***	0.909***	0.929***	0.938***	0.928***	0.941***	0.945***	0.976	
Media reports	0.768***	0.746***	0.814***	0.840***	0.823***	0.870***	0.863***	0.860***	0.878***	0.898***	0.900***	0.925***	0.932***	0.943***	0.910***	0.909***	0.974

The bold numbers in the above table are the square roots of AVE. The square roots of AVE for some factors are smaller than the maximum absolute value of the correlation coefficient between factors, which means that their discriminant validity is poor.

4.4.4 Descriptive statistics

Table 4.13 Frequency analysis results

Name	Options	Frequency	Percentage (%)	Cumulative percentage (%)
Gender	Male	202	48.675	48.675
	Female	213	51.325	100
Age	Under 20 years old	5	1.205	1.205
	20-~29 years old	34	8.193	9.398
	30~39 years old	67	16.145	25.542
	40~49 years old	97	23.373	48.916
	50~59 years old	105	25.301	74.217
	Over 60 years old	107	25.783	100
Education	Junior high school and below	142	34.217	34.217
	High school or technical secondary school	112	26.988	61.205
	Bachelor degree or college degree	147	35.422	96.627
	postgraduate	14	3.373	100

Payment methods for medical treatment	Personal Payment	34	8.193	8.193
	Provincial health insurance	110	26.506	34.699
	City Medical	127	30.602	65.301
	New Rural Cooperative Medical Scheme	144	34.699	100
Total		415	100	100

From the table above, we can see that: 51.33% of the samples will choose "female". 48.67% of the samples are male. 25.78% of the samples are "over 60 years old". The proportion of "bachelor's degree or junior college" is 35.42%. 34.22% of the samples are junior high school or below. The proportion of the samples who choose "New Rural Cooperative Medical Care" is 34.70%. 30.60% of the samples are municipal doctors.

4.4.5 Correlation analysis

Table 4.14 Pearson correlation - standard format

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Tangibility (1)	1																
Reliability (2)	0.664**	1															
Responsiveness (3)	0.699**	0.874**	1														
Guarantee (4)	0.734**	0.806**	0.855**	1													
Empathy (5)	0.682**	0.843**	0.840**	0.877**	1												
Willingness to seek medical treatment again (6)	0.721**	0.772**	0.817**	0.863**	0.861**	1											
Word of mouth publicity (7)	0.706**	0.806**	0.848**	0.872**	0.876**	0.920**	1										
Loyalty Behavior (8)	0.720**	0.785**	0.835**	0.854**	0.877**	0.900**	0.944**	1									
Waiting time (9)	0.710**	0.706**	0.790**	0.830**	0.784**	0.806**	0.818**	0.826**	1								
Medical Communication (10)	0.742**	0.782**	0.820**	0.876**	0.879**	0.889**	0.892**	0.914**	0.845**	1							
Treatment effect (11)	0.717**	0.776**	0.824**	0.878**	0.868**	0.879**	0.890**	0.914**	0.841**	0.922**	1						
Word of mouth (12)	0.719**	0.767**	0.811**	0.852**	0.854**	0.855**	0.879**	0.883**	0.868**	0.904**	0.928**	1					
Social Media (13)	0.723**	0.746**	0.797**	0.838**	0.830**	0.854**	0.858**	0.876**	0.871**	0.905**	0.921**	0.949**	1				

Recommended by friends and family (14)	0.707**	0.767**	0.793**	0.857**	0.855**	0.872**	0.889**	0.899**	0.842**	0.910**	0.944**	0.935**	0.936**	1			
Online reviews (15)	0.729**	0.726**	0.772**	0.831**	0.820**	0.859**	0.851**	0.859**	0.862**	0.895**	0.911**	0.910**	0.925**	0.927**	1		
Professional Recommendation (16)	0.711**	0.747**	0.790**	0.837**	0.823**	0.860**	0.870**	0.881**	0.836**	0.902**	0.913**	0.916**	0.922**	0.928**	0.910**	1	
Media reports (17)	0.723**	0.730**	0.790**	0.818**	0.809**	0.851**	0.847**	0.847**	0.867**	0.886**	0.881**	0.899**	0.929**	0.894**	0.894**	0.916**	1

* $p < 0.05$ ** $p < 0.01$

From the table above, we can see that correlation analysis is used to study the correlation between tangibility and reliability, responsiveness, assurance, empathy, willingness to seek medical treatment again, word-of-mouth publicity, loyalty behavior, waiting time, medical communication , treatment effect, word-of-mouth communication, social media, recommendation by relatives and friends, online evaluation, professional recommendation , and media coverage, a total of 16 items, and Pearson correlation coefficient is used to indicate the strength of the correlation. Specific analysis shows that:

Tangibles and reliability, responsiveness, assurance, empathy, willingness to seek medical treatment again, word-of-mouth publicity, loyalty behavior, waiting time, medical communication, treatment effect, word-of-mouth communication, social media, recommendation by friends and relatives, online evaluation, professional recommendation, media reports, a total of 16 items, all showed significant correlation, and the correlation coefficient values were 0.664, 0.699, 0.734, 0.682, 0.721, 0.706, 0.720, 0.710, 0.742, 0.717, 0.719, 0.723, 0.707, 0.729, 0.711, 0.723, and the correlation coefficient values were all greater than 0 , which means that tangibles and reliability, responsiveness , assurance, empathy, willingness to seek medical treatment again, word-of-mouth publicity, loyalty behavior, waiting time, medical communication, There is a positive correlation between 16 items, including treatment effect, word-of-mouth communication, social media, recommendations from friends and relatives, online reviews, professional recommendations, and media reports.

4.4.6 Structural equation

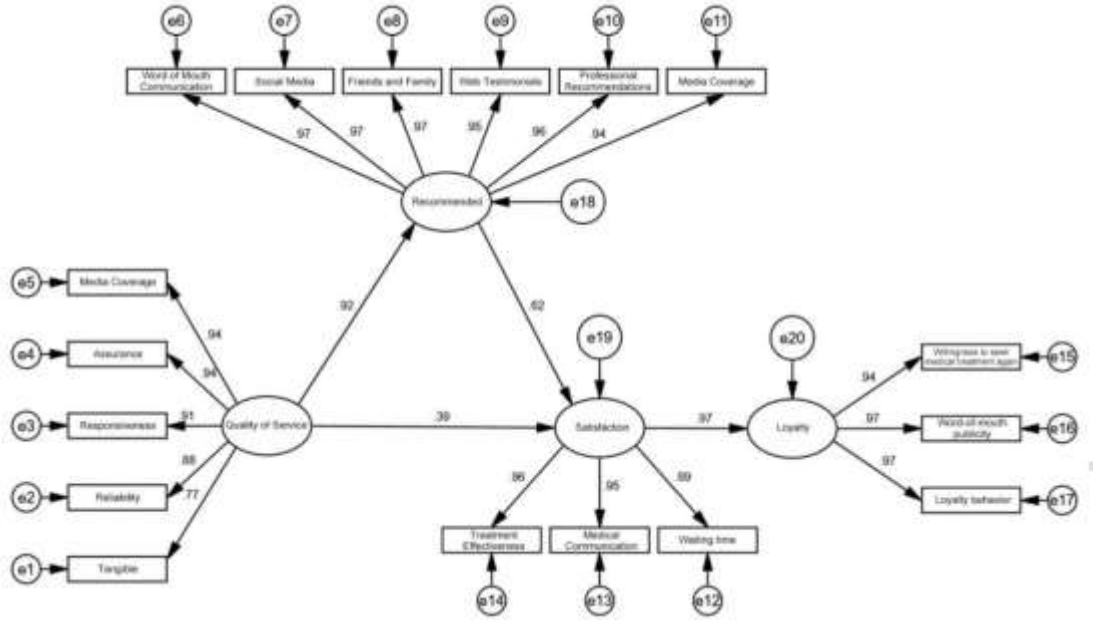

Figure 0.1 Structural equation

Source: LINGZHAO MENG, 2025

To test the causal relationship between service quality, recommendation, satisfaction and loyalty, and verify the research hypothesis.

Table 4.15 Model fitting index

Common indicators	Chi-square degrees of freedom ratio χ 2 / df	GFI	RMSEA	RMR	CFI	NFI	TLI
Judgment criteria	<3	>0.9	<0.10	<0.05	>0.9	>0.9	>0.9
value	5.203	0.853	0.101	0.010	0.963	0.955	0.956

Most of the model fitting indicators meet the standards, indicating that the model has good adaptability.

Table 4.16 Standardized path coefficient values

path			Estimate	SE	CR	P	STD Estimate
recommend	<---	Quality of Service	1.059	0.052	20.486	***	0.921
Satisfaction	<---	recommend	0.683	0.038	17.928	***	0.623
Satisfaction	<---	Quality of Service	0.497	0.045	10.96	***	0.394
Loyalty	<---	Satisfaction	0.831	0.028	29.788	***	0.965

When service quality affects recommendation, the standardized path coefficient value is 0.921>0, and this path is significant (z=20.486, p<0.05), which indicates that service quality has a significant positive impact on recommendation.

When it comes to the impact of recommendation on satisfaction, the standardized path coefficient value is 0.623>0, and this path is significant (z=17.928, p<0.05), which means that recommendation has a significant positive impact on satisfaction.

When service quality affects satisfaction, the standardized path coefficient value is 0.394>0, and this path is significant (z=10.96, p<0.05), which means that service quality has a significant positive impact on satisfaction.

When satisfaction affects loyalty, the standardized path coefficient value is 0.965>0, and this path is significant (z=29.788, p<0.05), which means that satisfaction has a significant positive impact on loyalty.

4.4.7 Mediation effect

Table 4.17 Mediation effect

Effect type	Parameter	Estimate	Lower	Upper	P
Total Effect	Service quality ⟶ satisfaction	1.221	1.097	1.37	0.000
Indirect effects	Service quality ⟶ recommendation ⟶ satisfaction	0.723	0.575	0.866	0.001
Direct Effect	Service quality ⟶ satisfaction	0.497	0.368	0.665	0.000

All three effects hold, and mediation is established and partial.

Chapter 5
Summary of Research Findings and Recommendations

5.1 Summary of findings

The results of this study showed that in the evaluation of medical service quality, there was a positive correlation between 17 variables, including tangibility, reliability, responsiveness, assurance, empathy, willingness to seek medical treatment again, word- of-mouth publicity, loyalty behavior, waiting time, medical communication, treatment effect, word-of-mouth communication, social media, recommendation by relatives and friends, online evaluation , professional recommendation, and media reports. Service quality had a significant positive impact on satisfaction, service quality on recommendation, recommendation on satisfaction, and satisfaction on loyalty. Recommendation played a mediating role in the impact of service quality on satisfaction. Service quality indirectly affects satisfaction through recommendation (indirect effect 0.723), and recommendation directly and positively affects satisfaction (path coefficient 0.623). According to data analysis, all five hypotheses are established. As key indicators for measuring hospital performance appraisal and service quality, inpatient satisfaction and loyalty have received increasing attention. This study aims to deeply analyze the intrinsic relationship between inpatient satisfaction and loyalty, and innovatively incorporate recommendation by relatives and friends as a moderating variable to reveal its unique role in the influencing path. Medical institutions should attach importance to the role of recommendation by relatives and friends, and enhance the positive effect of recommendation by relatives and friends by improving the quality of medical services and optimizing patient experience. At the same time, medical institutions should pay attention to patient satisfaction and improve the quality of medical services to enhance patient loyalty.

The service quality gap model is feasible for the analysis and application of inpatient satisfaction. This study provides hospital managers

with a reliable theoretical analysis approach to improve the quality of medical services. Medical institutions should strengthen communication with patients, understand their needs and expectations, adjust service strategies in a timely manner, and improve the tangibility and reliability of medical facilities to improve patient experience. Through the above measures, medical institutions can effectively improve patient satisfaction and loyalty, improve the quality of medical services, and thus stand out in the fierce market competition.

5.2 Discussion of the results

The results of this study show that there is a significant positive correlation between inpatient satisfaction and loyalty, and the impact of service quality on patient satisfaction is of great significance. Through the study of path analysis, it is found that factors such as service quality, family and friend recommendations, and patient expectations have a significant effect on the satisfaction of inpatients. Among them, service quality is considered to be the core factor affecting patient satisfaction, and the recommendation of family and friends plays a key role in patients' choice of hospital, which further verifies the importance of word-of-mouth effect in the field of medical services.

The study found that service quality had a significant positive impact on recommendation behavior, patient satisfaction and loyalty, which was consistent with existing related studies. The patient's medical experience is directly related to the quality of the hospital's service, and the high-quality service provided by the hospital can effectively improve patient satisfaction, thereby enhancing the loyalty of patients to the hospital. Despite the high level of patient satisfaction, the study also revealed low patient loyalty, which may reflect the high demand that patients place on hospital services during the actual treatment process, and patients may still choose to change hospitals due to their low dependence on other hospitals despite the quality of hospital services that meet these expectations.

In the analysis of loyalty, this study highlights the direct impact of patient satisfaction on loyalty. Through path analysis, we see that patient satisfaction plays a decisive role in the improvement of their loyalty. While improving patient satisfaction, hospitals should further strengthen the emotional connection between patients and hospitals, so that they can prioritize the hospitals they are familiar with in future medical treatment choices.

Improving the quality of service, valuing patient expectations, capitalizing on the referral effect of family and friends, and effectively managing patient satisfaction will be key to improving patient loyalty in hospitals. Based on the findings of this study, hospitals should further optimize the service process and environment to improve the overall medical experience of patients, so as to promote long-term patient loyalty and sustainable development of hospitals.

5.3 Suggestions

This study, through an in-depth study of inpatient satisfaction and loyalty, revealed the important role of recommendations from relatives and friends as a moderating variable in improving the quality of medical services. Based on the research results, this study makes the following recommendations to the medical industry:

5.3.1 Pay attention to the role of recommendations from relatives and friends

Recommendations from relatives and friends are an important basis for patients to choose medical institutions and play an important role in improving the quality of medical services. Medical institutions should actively establish and use positive word-of-mouth to improve patients' trust and loyalty to medical services. This can be achieved by strengthening communication with patients, providing high-quality medical services, and optimizing service processes.

5.3.2 Improving the quality of medical services

The quality of medical services is a key factor affecting patient satisfaction and loyalty. Medical institutions should pay attention to patient needs and provide high-quality medical services to meet patient expectations. This includes improving medical technology, optimizing service processes, strengthening the construction of medical staff teams and technical training, improving the professional quality and service level of medical staff, strengthening service quality awareness, and making service quality improvement the core goal of hospital development. This includes establishing a service quality management system and conducting service quality evaluation. At the same time, medical service innovation should be strengthened, new

service models and service contents should be explored to meet the diverse needs of patients, and information construction should be strengthened to provide high-quality and efficient medical services.

5.3.3 Improving patient satisfaction

The design of hospital service processes must take patients as the fundamental starting point, maintain the concept of "patient first, sincere care", take patients as the center, optimize service processes, simplify medical procedures, improve medical service efficiency, minimize or integrate unnecessary outpatient or hospitalization links, shorten the time required for necessary processes as much as possible, and further improve the timeliness and effectiveness of medical services. Due to the general improvement of modern people's quality of life, patients and their families have increased their requirements and attention to the hospital environment and logistics services, making the connection between the hospital environment and logistics services and patient satisfaction closer than before. Combined with the results of this survey, it is recommended that hospitals increase investment in hospital environment and logistics construction, and designate special personnel to be responsible for regional cleaning to ensure the cleanliness of the diagnosis and treatment environment. Strengthen the supervision and inspection of daily cleaning in key areas such as toilets and elevators. Improve hospital facilities, optimize the hospital environment, create a comfortable medical atmosphere, etc., so as to improve patients' medical experience. Improve the quality of meals in the canteen, increase investment and management in the canteen, provide personalized services according to the different needs of patients, introduce information technology, and provide patients with more convenient and fast meal ordering services. At the same time, we should strengthen the observation of the patient's condition, provide timely health education on medication and disease-related knowledge, actively communicate with the patient's family, adjust the education plan in time, and strive to provide patients with more appropriate nursing services. Therefore, medical staff should learn to communicate with patients effectively, communicate in a language that patients can understand, and have the ability to listen effectively, understand the patient's important demands in the patient's explanation, patiently answer questions and make patients feel that their demands are heard and valued. This is the basis and focus of establishing good communication. Establish a patient feedback mechanism, seriously adopt good suggestions and actively improve them, and truly make patients feel satisfied.

5.3.4 Improve patient loyalty

Patient loyalty is related to the willingness to seek medical treatment and word-of-mouth communication. The willingness to seek medical treatment is positively correlated with the willingness to spread word-of-mouth communication. The higher the willingness to seek medical treatment, the more it will affect the willingness to spread word-of-mouth communication. Patients will affect their willingness to seek medical treatment because of their loyalty to doctors or hospitals, and then recommend them to patients with medical needs, achieving word-of-mouth communication effects, and thus improving the brand image of hospitals or doctors. With the improvement of the quality of life, people's expectations for medical services are increasing day by day, and the hospital management system is also constantly changing. Therefore, it is very important for hospitals to improve patient loyalty to seek deeper quality. Provide a reference for providing higher quality medical services.

5.3.5 Advice for future research

The results of this study have important significance and application value. First, through the study of the factors affecting inpatient satisfaction and loyalty, the moderating role of recommendation in inpatient satisfaction and loyalty was obtained, and four new scales were designed to fill the research gap and provide strategies and suggestions for medical institutions to improve the quality of medical services and improve patient satisfaction. It also provides reference and reference for research in other related fields and provides new research directions and ideas for future related research.

In summary, through the research and analysis of "Analysis of influencing factors of inpatient satisfaction and loyalty based on the SERVQUAL model: the moderating role of recommendations from relatives and friends", important results and findings in this field have been obtained. However, there are still some limitations in existing research. First, the selection and scale of the research sample are limited, and may not represent the situation of the entire patient population. Secondly, existing research mainly focuses on specific regions or specific medical institutions, and lacks cross-regional and cross-institutional comparative studies. In addition, This article focuses on offline recommendations from family and friends. Future research can further integrate behavioral science and digital technology to explore a multidimensional and dynamic theoretical system for medical service quality. Further research is needed to fill research gaps and improve research methods. In the future, more variables can be selected to study the impact on patient satisfaction and loyalty, provide reference and

guidance for medical institutions, better improve the quality of medical services, and thus stand out in the fierce market competition.

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Appendix

Research Questionnaire

Medical service quality scale

Dimensions	illustrate
Quality of Service	
Tangibles	1. Are the signs and instructions in the hospital clear? 2. Is it quiet near your ward at night? 3. Are your ward and bathroom clean and odor-free ? 4. Is the food provided by the hospital satisfactory?
Reliability	1. Did the medical staff tell you the name of the medicine each time you took it (including oral and injection) ? 2. Did the medical staff tell you the function of the drug when you first used it (including oral and injection) ? 3. Did the medical staff tell you about the side effects of the drug when you first used it (including oral and injection) ?
Responsiveness	1. Did you receive help promptly after you pressed the call bell ? 2. When you are in unbearable pain , do the medical staff try their best to help you relieve it? 3. Do you usually provide timely assistance when you need to use the toilet or bedpan?
Assurance	1. Is the admission procedure simple and clear? 2. Is the discharge procedure simple and clear? 3. Did the medical staff tell you what to pay attention to after discharge? 4. Are the items and handwriting on the expense list clear when you are discharged? 5. Are you aware of the health precautions after discharge?
Empathy	Do the nurses treat you with respect during hospitalization ? Did the doctor treat you with respect during hospitalization ? 3. Did the nurse explain the questions in a way you could understand during your hospital stay ? 4. Did the nurse listen to you carefully during hospitalization ?

	5. Did the doctor listen to you carefully during hospitalization ? 6. During hospitalization, did the doctor explain the problems in a way that you could understand ? 7. Do medical staff treat visiting relatives and friends with respect?
Customer Loyalty	
Willingness to seek medical treatment again	1.Are you willing to choose our hospital for treatment or medical treatment again in the future? 2.If you needed the same type of treatment, would you choose our hospital again? 3.If you needed other types of treatment, would you consider receiving it at our hospital?
Word of mouth	1.Would you recommend our hospital to your family, friends or colleagues? 2.If your family, friends or colleagues need similar treatment, would you recommend them to our hospital? 3. Are you willing to share your positive experiences at our hospital on social media?
Loyalty Behavior	1.If your condition requires long-term treatment, would you choose to continue receiving treatment in our hospital? 2.If you need other types of treatment, would you give priority to receiving treatment in our hospital? 3.If you need medical help, would you choose our hospital first?
Service satisfaction	
Waiting time	1. Was the length of time you waited before seeing a doctor what you expected? 2.How satisfied are you with the length of waiting time? 3. Do you think waiting time affects your overall evaluation of hospital services?
Medical communication	1.Do you think your doctors and other medical staff explained your condition and treatment options clearly to you?

	2. Do you feel that doctors and other medical staff care about and understand you? 3. Do you feel you have adequate opportunities to raise questions or concerns with your physician and other health care professionals?
Treatment Effects	1.Did you feel any significant improvement in your symptoms after treatment? 2.Are you satisfied with the treatment provided by the hospital? 3.Would you recommend this hospital to others who need similar treatment?
Recommended effect	
Word of mouth	1.Have you heard other people say good things about this hospital? 2.Have you heard others speak positively about this hospital in your daily communication? 3.Have you noticed people in the community talking positively about this hospital?
Social Media	1.Have you seen any positive reviews or shares about this hospital on social media? 2.Have you seen other people recommend this hospital in online communities? 3. Do you follow the hospital's official social media accounts and see any positive comments or shares?
Recommended by friends and family	1.Has anyone you know recommended this hospital to you? 2.Have you ever considered seeking medical treatment at this hospital because of the recommendation of friends, family or colleagues? 3.Have you discussed your experience with this hospital with people close to you?
Online reviews	1.Have you actively searched for reviews of this hospital on the Internet? 2.Have you found any positive reviews or recommendations about this hospital?

	3. When you check online reviews, are you influenced by these reviews and consider going to this hospital for treatment?
Professional recommendation	1.Has a medical professional recommended this hospital to you? 2.Have you ever chosen this hospital for medical treatment because of a recommendation from a doctor or other medical professional? 3. Do you trust this hospital based on the professional advice given by medical professionals?
Media reports	1.Have you seen any positive reports or recommendations about this hospital in the news? 2.Have you seen good reviews about this hospital in newspapers, on TV or online news? 3. Were you influenced by the information in media reports to consider choosing this hospital?
Basic Situation	1.What is your gender: male, female? 2.How old are you ? Under 20 , 20-29 , 30-39 , 40-49 , 50-59 , Over 60 . 3.What is your educational level: junior high school or below, high school or vocational school, undergraduate or junior college, graduate school? 4.What are your payment methods for this visit: personal payment, provincial medical insurance, municipal medical insurance, and new rural cooperative medical insurance?

This scale is derived from the inpatient satisfaction survey released by the National Medical Management Center

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