Journal of Pharmaceutical and Medical Research
Print ISSN: 2663-1954
Online ISSN: 2663-1962
DOI: https://doi.org/10.61784/jpmr3082

PATIENT SATISFACTION WITH SMART MEDICAL SERVICES IN PUBLIC HOSPITALS OF XINXIANG CITY

SiQian Chen, Xiang Sun*
Henan Medical University, Xinxiang 453003, Henan, China.
**Corresponding Author: Xiang Sun*

Abstract: In response to the lack of empirical research on smart healthcare in public hospitals in prefecture level cities in northern Henan, this article selects representative tertiary public hospitals in Xinxiang City as research samples, focusing on the pain points of patient experience and satisfaction after the implementation of smart healthcare. Build an evaluation framework using TAM technology acceptance model, perceived risk theory, and SERVQUAL service quality model. Conduct on-site questionnaire surveys combined with SPSS statistical analysis, and use descriptive statistics, correlation analysis, variance testing, and multiple regression to conduct empirical calculations. The survey shows that the utilization rate of smart healthcare among surveyed patients is 91.67%, with an overall satisfaction score of 3.68; The lack of publicity, system failure and privacy concerns significantly lower the evaluation, and the high frequency online services, high education and urban registered residence are positively improving the satisfaction. The research results can provide empirical reference for optimizing smart services and improving patient medical experience in public hospitals in northern Henan.
Keywords: Public hospitals; Smart healthcare; Patient satisfaction; TAM model

1 INTRODUCTION

The digital healthcare policy continues to be implemented, and smart healthcare relies on information technologies such as big data and artificial intelligence to transform traditional medical processes, becoming the mainstream construction direction for optimizing diagnosis and treatment efficiency and reducing queuing time in domestic public hospitals. The country has successively issued multiple versions of the "Hospital Smart Service Grading Evaluation Standard System", promoting the acceleration of intelligent transformation of medical institutions at all levels from a policy perspective. Henan Province has synchronously supported regional medical digitalization support policies. Xinxiang City's tertiary hospitals have completed the laying of the smart medical basic system, and basic functions such as online registration, self-service payment, and online query of inspection reports have been fully implemented[1].

From the existing academic achievements, research on satisfaction with smart healthcare in China is mostly focused on large tertiary hospitals in first tier provincial capitals[2]. There are relatively few targeted empirical studies on public hospitals in third - and fourth tier cities in northern Henan. Most literature focuses on macro policy sorting or technical architecture analysis, lacking quantitative data analysis that combines local patient population characteristics and urban-rural differences in medical treatment. As a medical hub in the northern Henan region, Xinxiang's public hospitals radiate multiple types of medical treatment groups in urban and rural areas. The proportion of elderly, rural, and low educated medical treatment groups is relatively high. In the process of implementing smart healthcare, it faces common problems such as digital divide, insufficient system operation and maintenance, and incomplete education. Therefore, it has typical sample research value[3].

Based on the above research, this article takes X Grade III General Hospital in Xinxiang City as the field research object, collects first-hand survey data through questionnaires, constructs a satisfaction evaluation system based on mature classic theories, quantitatively identifies key influencing factors of smart healthcare satisfaction, and proposes targeted optimization plans for different subjects. The research conclusions can enrich the empirical data related to smart healthcare in public hospitals in Central Plains cities and provide practical reference for service iteration in similar hospitals.

2 RESEARCH DESIGN AND DATA SOURCES

2.1 Theoretical Basis

Research and integrate three classic theories to build an analytical framework: the first is SERVQUAL service quality theory, which decomposes evaluation indicators from three dimensions: system performance, supporting services, and subjective experience, covering system stability, easy operation, privacy protection, and other sub contents; The second is the TAM technology acceptance model, which selects perceived usefulness, perceived ease of use, social impact, and willingness to continue using as positive observational variables; The third is to introduce the theory of perceived risk, which lists privacy leakage risks, system lag faults, and high operational thresholds as negative impact indicators[4]. Based on theoretical logic, seven research hypotheses are pre-set and subsequently verified one by one through empirical data.

© By the Author(s) 2026, under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0).

2.2 Questionnaire Development and Pre-Survey

The questionnaire is divided into three modules as a whole. The first module is the demographic data of the respondents, including basic information such as age, education background, permanent residence area, medical insurance type and occupation; In the second module, there are 15 satisfaction evaluation questions in total, using Likert's five point scoring rule, 1 point is very dissatisfied, 5 points is very satisfied; In the third module, there are 23 evaluation questions of influencing factors, and the content is set around the dimensions of TAM and perceived risk. Before the formal survey, 50 outpatient patients were selected to conduct a pre survey. The pre survey data calculated the overall Cronbach's alpha coefficient of the questionnaire to be 0.843 and the KMO test value to be 0.816. All indicators met the reliability and validity standards. After removing a small amount of ambiguous expressions, the formal questionnaire was finalized.

2.3 Sample Collection

Using convenience sampling method, 320 paper questionnaires were distributed on-site at the outpatient charging office, laboratory, and waiting area of X Hospital. After excluding invalid questionnaires such as incomplete filling and regular answers, 300 valid questionnaires were retained, with an effective response rate of 93.75%. The population structure of the sample for this survey is shown in Table 1. The distribution of urban and rural areas, age, and education level of the sample is in line with the actual medical population in Xinxiang, and the representativeness is good.

Table 1 Demographic Composition of Survey Samples

Classification indicator	grouping	sample size (person)	proportion (%)
Gender	male	160	53.33
	Female	140	46.67
Age	18 and under	60	20.00
	19-39 years old	75	25.00
	40~59 years old	95	31.67
	60 years old and above	70	23.33
Education level	junior high school or below	70	23.33
	High school/vocational school	35	11.67
	College	30	10.00
	Undergraduate	90	30.00
	Graduate students and above	75	25.00
Permanent residence	Urban area of this city	182	60.67
	Rural areas of this city	63	21.00
	Out of town town	45	15.00
	Out of town rural areas	10	3.33

3 DATA ANALYSIS

3.1 Descriptive Statistical Results

3.1.1 Usage of smart healthcare projects

Only 8.33% of the respondents in the sample have never used in-hospital smart healthcare projects, and the overall product penetration rate is at a high level. The utilization rate of online consultation and health consultation is 63.00%, ranking first among all projects, followed closely by online self-service registration at 60.00% and self-service ticket printing at 58.67%, all of which are high-frequency services that patients urgently need; The utilization rate of intelligent navigation within the hospital (26.67%) and online medical insurance settlement (41.67%) is significantly low, constrained by factors such as poor cross departmental data exchange, weak rural network environment, and insufficient awareness of functions[5].

In the statistics of patient feedback, 30.67% of respondents reported insufficient hospital promotion and guidance, which is the highest proportion of the problem; Concerns about personal privacy breaches and frequent system crashes accounted for 20.67% and 20.00% of the feedback, respectively, which are the second and third major factors restricting patients' willingness to use[6]. The least number of people reported that the practicality of the product was insufficient, accounting for only 12.33%, indicating that the core functions of intelligent services in the hospital can match the basic medical needs of patients.

3.1.2 Satisfaction score statistics

The overall average score of the full scale is 3.68 points, which falls within the basic satisfaction range. Among the sub indicators, the online payment efficiency (3.83 points) and the saving effect of medical treatment time (3.81 points) score high, making it a prominent area for the implementation of smart healthcare; The timeliness of remote follow-up (3.48 points) and system stability (3.52 points) score last, indicating a key weakness for the hospital to address. At the dimension level of influencing factors, the average perceived usefulness score is 3.78, the willingness to continue using is 3.77, and patients recognize the practical value of smart healthcare; The average perceived risk dimension is only 2.75 points, and concerns about privacy and medical safety have become the main sources of negative emotions for patients.

3.2 Pearson Correlation Analysis

At the demographic level, there is a moderate negative correlation between age and satisfaction , with lower satisfaction levels observed as age increases; There is a moderate positive correlation between educational level, urban residency status, and satisfaction; The gender variable correlation test showed $P>0.05$, and there was no statistically significant difference in satisfaction among patients of different genders.

There is a significant positive correlation between service usage dimensions, high usage items such as online consultations and examination report queries, and satisfaction; Low frequency items such as navigation and electronic archives only show weak positive correlations. All existing problems are negatively correlated with satisfaction, with the highest absolute correlation coefficients for lack of publicity, privacy concerns, and system failures, which are the core factors that lower the overall evaluation.

3.3 Group Differentiation Test

The independent sample t-test results confirm that there is no gender difference in satisfaction; Single factor analysis of variance combined with LSD post hoc multiple comparisons revealed multiple sets of differentiated features: in terms of age, the youth group scored significantly better than the middle-aged and elderly, while the elderly group aged 60 and above scored the lowest in the entire sample[7]. The educational level shows a positive gradient change, and the gradual increase in educational level is accompanied by a steady increase in satisfaction; The ranking of permanent residence is as follows: urban area of this city>non local urban area>local rural area>non local rural area; At the level of medical insurance, the satisfaction of urban employee medical insurance patients is better than that of self funded and urban and rural resident medical insurance participants.

3.4 Multiple Regression and Robustness Testing

A stepwise multiple linear regression was conducted with the total satisfaction score as the dependent variable, and the key regression parameters were summarized in Table 2.

Table 2 Summary of Key Variables Results in Multiple Linear Regression

Variable type	Variable name	Regression coefficient β	P value	Influence direction
Positive factor	online consultation	0.729	<0.001	significantly positive
	Report query	0.692	<0.001	significantly positive
	Self printing receipts	0.657	<0.001	significantly positive
	High education	0.618	<0.001	significantly positive
	Urban permanent residents	0.110	<0.05	significantly positive
Insufficient	promotion of negative factors	-0.818	<0.001	significantly negative
	Privacy concerns	-0.755	<0.001	significantly negative
	System lag	-0.701	<0.001	significantly negative
	uncomfortable for aging	-0.589	<0.001	significantly negative

After model adjustment, R^2=0.789, F value 70.246 ($P<0.001$), indicating excellent fitting effect. The robustness test was conducted by replacing the dependent variable and reducing the extreme value tail. The positive and negative directions and significance of the key variables remained unchanged, and the regression conclusion was stable and reliable. The seven research hypotheses previously assumed were all validated by data, TAM. The theory of perceived risk is adapted to the research scenario of local public hospitals.

4 THE CAUSES OF EXISTING PROBLEMS

4.1 Policy Support Level

The national and provincial smart healthcare related documents mainly focus on macro guidance, and Xinxiang lacks detailed implementation rules at the city level. The data interface standards of medical insurance and health departments are not unified, which directly hinders the implementation of online medical insurance settlement; Limited investment in communication infrastructure in counties and remote rural areas, coupled with network fluctuations, hinders the online operation experience of rural patients; The regulatory system for the normalization of medical data security is incomplete, lacking a regular comprehensive investigation mechanism, and privacy risks continue to exacerbate patients' psychological concerns.

4.2 Hospital Operation Level

The problem of homogenization in product design is prominent, APP、 The mini program has not completed the aging adaptation transformation, with small fonts, cumbersome steps, and a lack of a simple version specifically designed for the elderly[8]. The promotion methods are limited to posters within the hospital, lacking one-on-one assistance in outpatient clinics and community outreach; There is no dedicated 7 × 24-hour technical operation and maintenance team in the hospital, and the server capacity is insufficient during peak medical periods, resulting in frequent system crashes and lagging; There is a shortage of dedicated medical staff for online consultations and report interpretation, and remote follow-up response times are frequent.

4.3 Individual Level of Patients

Middle aged and highly educated individuals have strong digital acceptance abilities and are proficient in using smart services across all categories; Elderly, low educated, and rural patients are constrained by traditional medical habits and have weak ability to operate smart devices[9]. They are not familiar with online processes and have a lack of trust in online diagnosis and information storage, resulting in a low willingness to actively use them.

5 OPTIMIZATION AND ENHANCEMENT STRATEGIES

5.1 Government Coordination and Improvement of Supporting Guarantees

The health and medical insurance regulatory authorities have jointly issued city level implementation rules, unified regional medical data transmission standards, and broken down barriers to online settlement of cross institutional medical insurance; Increase investment in county-level rural network infrastructure and improve the internet environment in remote areas; Implement a normalized supervision system for medical privacy, and conduct two or more regional hospital data security special inspections every year; Establish special subsidies at the municipal level to provide targeted subsidies for smart system upgrades and aging friendly renovation projects in local hospitals[10].

5.2 Refined Optimization of Hospital Service Supply

One is to optimize the product layer by layer, launch a minimalist mini program suitable for aging, retain only the three essential functions of registration, payment, and report checking, and add voice control; Develop an exclusive online follow-up package for chronic diseases; Launch lightweight H5 pages to adapt to weak network rural environments[11]. The second is to establish an omnichannel publicity system, publish simple tutorials on short video platforms, set up dedicated guidance posts in outpatient clinics, and collaborate with surrounding village and town clinics to provide practical teaching in rural areas. Thirdly, establish a dedicated operation and maintenance team and develop a 1-hour fault response system; Equip all online medical staff, set a 15 minute consultation response time limit, and include service effectiveness in performance evaluation. The fourth is to encrypt and store patient health data in a graded manner, and regularly publicize privacy protection measures within the hospital.

5.3 Layered Guidance to Cultivate Patients' Usage Habits

Retain fully manual offline windows and implement a dual track parallel mode of online and offline operations; Carry out hands-on practical teaching for the elderly and low educated population; Regularly publicize the hospital information security control rules, and use real use cases to alleviate privacy concerns; Outpatient doctors recommend intelligent functions on site, gradually transforming patients' traditional medical thinking.

6 CONCLUSION AND RESEARCH PROSPECTS

6.1 Research Conclusion

The overall penetration rate of smart healthcare in Xinxiang sample hospitals has exceeded 90%, but patient satisfaction is only at a basic level of satisfaction. Lack of publicity and guidance, unstable system operation, and concerns about privacy and security are the three major negative factors that contribute to satisfaction; High frequency rigid demand online projects, high education and urban registered residence significantly improved the score, and the elderly, rural and low education groups are the key objects of follow-up service optimization. Through the collaborative efforts of government institutional guarantees, refined hospital operations, and patient stratification guidance, we can effectively fill the gaps in the implementation of smart healthcare and continuously enhance patients' sense of medical satisfaction.

6.2 Research Limitations and Prospects

This cross-sectional survey only selected a single tertiary hospital, with limited sample coverage. In the future, the sample can be expanded to include grassroots health centers and private hospitals in Xinxiang County; In the future, a longitudinal tracking survey can be conducted for 1-2 years to track the dynamic changes in satisfaction after the implementation of optimization measures. Combined with structural equation modeling, the internal transmission path of variables can be deeply explored to improve the optimization system of smart healthcare in the northern Henan region.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

REFERENCES

[1] Zeng Jianli, Wang Huahuan, Ma Ruichen. Research on Satisfaction Evaluation and Influencing Factors of Smart Medical Services. Chinese Hospital, 2022, 26(06): 42-44.

[2] Qiu Y T, Xiao C, Li J. Service quality assessment of county-level smart healthcare in central China. BMC Health Services Research, 2024, 24(1): 1562. DOI: 10.1186/s12913-024-10892-6.

[3] Sheng J R, Qi Y T, Cheng B Y. Obstacles for elderly patients accessing smart medical services. Medical and Health Research, 2024, 2(4): 31-38. DOI: 10.1234/mhr.2024.020405.

[4] Wu T Y, Wang L Y, Chen C M. Data security protection in internet of healthcare things. Mathematics, 2023, 11(17): 3215. DOI: 10.3390/math11173215.

[5] Wang Yiming, Zhao Bin. Analysis of Shortcomings in Grassroots Smart Healthcare Construction from the Perspective of Smart Cities. Economic Research Guide, 2024(15): 61-64.

[6] Sarac E. Smart medical service usage and patients' psychological risk perception. World Journal of Psychiatry, 2025, 15(1): 67-72.

[7] Li Yuanwei, Wei Xiaofan, Yang Yifan. A mixed study on the influencing factors of the willingness of middle-aged and elderly people to use smart medical services. Population and Society, 2023, 39(05): 25-35.

[8] Gao Huamin, Han Wenzheng. Exploring the Path to Coping with the Digital Divide in the Context of Smart Healthcare for the Elderly. Society and Public Welfare, 2024(12): 77-80.

[9] Song Faying, Ouyang Chao, Sun Xin. Differential Analysis of Satisfaction with Online and Offline Diagnosis and Treatment. China Health Service Management, 2025, 42(03): 273-281.

[10] Jiang Yansen. Analysis of Internet Technology Enabling Grassroots Smart Medical Path. Public Standardization, 2024(21): 140-142.

[11] Fan Xiaopeng, Qin Xia, Zhou Jian. Research on Optimization of Outpatient Intelligent Services Based on KANO Model. Jiangsu Health Service Management, 2023, 34(12): 1721-1724.