Patient Preference and Adherence

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ORIGINAL RESEARCH

National Patient Satisfaction Survey as a Predictor for Quality of Care and Quality Improvement – Experience and Practice

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Background: Patient satisfaction is an important predictor of quality of care and hospital services. Patient satisfaction survey provides not only valuable insight into patient experience of care but also evidence that guides quality improvement in both system and organization levels. The paper aims to prove the value of system-wide satisfaction survey of patients and demonstrate whether data collected from a national patient satisfaction survey in three-year period can predict trends in patient experience of care.

Methods: Patient satisfaction data of 148 hospitals were extracted from the annual National Public Hospital Patient Satisfaction Survey (NPHPSS) for Shandong Province between 2019 and 2021. Pearson test or Spearman test was performed to clarify the differences in satisfaction and relationship between variables. A linear regression model was established to describe the impact of variables on satisfaction.

Results: From 2019 to 2021, there was a significant enhancement in overall patient satisfaction, particularly in communication areas, for both outpatients and inpatients ($p = 0.000$). A strong and positive correlation between outpatient and inpatient satisfaction was observed over three years ($p = 0.000$). However, outpatients reported lower satisfaction than inpatients regarding the hospital environment and communication ($p < 0.05$). Patient care experiences also varied across different hospital categories. In addition, the maturity of the Health Information Management System (HIMS) positively influenced inpatient satisfaction ($p < 0.05$).

Conclusion: A nationwide patient satisfaction survey can predict benefits of quality improvement initiatives and identify changing trends in the quality of hospital care. The strong correlation between outpatient and inpatient satisfaction underscores the importance of consistent medical service quality across the hospitals. HIMS upgrades are a worthwhile investment in enhancing patient experiences in public hospitals. Tailoring service improvement strategies to specific hospital contexts, such as type, location, and patient demographics, is crucial.

Keywords: patient satisfaction, quality of care, healthcare information management system, clinician communication

Background

Patient satisfaction is broadly referred as patient's perception and experience of health care service that they receive.[1] It is an indicator of how well a healthcare provider or system meets the needs and preferences of the patient.[2] Due to its subjective nature, studies on patient satisfaction are challenged by the lack of a universally accepted definition or measure.[3] More studies tend to measure satisfaction from patient's perspectives, which can better improve safety, accessibility, equity, and comprehensiveness of care and maximize patient retention.[4,5] As one of the most commonly used models, the SERVQUAL model developed based on the Total Quality Management (TQM) Theory[6] has been widely applied in medical field, which can comprehensively evaluate medical service quality.[7] It includes dimensions of tangibility, reliability, responsiveness, assurance, and empathy which may be measured by facilities and equipment, doctor-patient communication, nursing responsiveness, environment, cost, etc., in the medical services.[8]

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Patient satisfaction is a crucial indicator of healthcare quality, providing insights into how well healthcare providers meet the expectations that matter most to their patients.[9] It is also a pivotal factor in shaping patients' behavioral intentions.[10] As a barometer of the quality of care, patient satisfaction helps healthcare services gain insight into patient experience and assess the standard of service delivery.[11] Patient satisfaction has also been used to measure and compare the performance of health care providers,[12,13] and high patient satisfaction is conducive to enhancing hospital's competitive advantage.[14] It has been proven to be correlated with improved health outcomes, such as superior compliance, decreased utilization of medical services, and less malpractice litigation.[1] In particular, empirical evidence indicates a positive relationship between patient satisfaction and clinical care performance, such as shorter length of stay, lower readmission rates, lower mortality, etc.[15–17]

Patient's experience of care can be influenced by multiple factors such as safety, equity, evidence-based practice, timeliness, efficiency, patient-centered approach adopted.[18] Patient's demographic factors, such as age, gender, health status primary language and level of education, were found to be related to patient satisfaction.[19,20] In addition, patient expectation is an important predictor of patient satisfaction, as well as treatment results and self-perceived health status.[18] On the other hand, hospital size, bed number, location and physical environment are also non-negligible factors, although the results of studies are heterogeneous.[21–23] The development of health information technology (HIT) in hospitals, such as electronic health records (EHRs), online appointment, mobile terminal for admission and discharge, has proven improving the efficiency of medical service.[24] However, there is no conclusive empirical evidence on the impact of health information system on patient satisfaction.

Patient experience of care was also influenced by clinician's interpersonal skills and their interaction with patients. For example, clinician's ability to take patient's expectations into consideration during the diagnostic and care process as a direct effect on patient satisfaction.[25] Factors related to service efficiency, such as waiting time, administrative procedures, basic medical equipment, are also key interventions for patient satisfaction.[18,26] However, the extent and correlation of these factors on patient satisfaction at the hospital and health system levels have not been fully clarified.

Many hospitals routinely survey patients on their experience and perception of care to comprehend the reflection of patients to their services.[27] In addition, questionnaire survey - the most widely used method, patient's satisfaction of care can be investigated by direct observation, telephone follow-up, and interviews.[28,29] At the system level, large-scale survey on patient satisfaction has been used to guide reimbursement from government and insurance scheme as part of the value-based purchasing. Examples may include the public report of Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey in the United States,[30] the National Health Service (NHS) Patient Surveys in England,[31] and Patient Experience Survey conducted by the Australian Bureau of Statistics.[32] However, a quick desktop search by the authors of the paper has not identified studies that explored the significance of such surveys in enhancing the entire healthcare system and the performance of hospitals at various levels.

In China, the suboptimal patient experience with healthcare processes, poor communication experience with medical professionals, and mistrust in physicians have been identified as the principal factors contributing to the escalating tensions between clinicians and patients, as well as the rise in medical disputes.[33,34] It is a matter of urgency to improve patient experience to enable hospitals in gaining competitive advantages.[35] Two of the national initiatives in China include the National Public Hospital Patient Satisfaction Survey (NPHPSS) introduced since 2017 and the three-year action plan launched by the National Health Commission in 2018. The three-year action plan aims to improve the quality of care by promoting a patient-centered approach, strengthening patient-privacy protection and applying the outpatient appointment system nationwide, etc.[36] The annual NPHPSS has been serving as a comprehensive tool to gauge the sentiments of Chinese patients regarding the healthcare services that they receive after successfully piloted across China in 2017.[37,38] NPHPSS is administered by Medical Management Service Guidance Center of National Health Commission and accessed via WeChat QR code to eliminate multiple entries by a single person in the same year. It provides evidence on hospital performance across the country using WeChat questionnaires.[39]

Based on the NPHPSS data on 148 public hospitals in Shandong Province in 2019, 2020 and 2021, the paper will examine whether the national survey can predict the effects of hospital quality improvement across Shandong Province by answering the following questions.

1) What has been the trend of patient experience of care in public hospitals in Shandong Province between 2019 and 2021? Is the improvement trend consistent between inpatient and outpatient in the hospitals?
2) Has there been improvement in clinician's interaction with patients?

3) What are the key factors that affect patients' overall satisfaction of care?

In addition to answering the above questions, the paper will capture learnings from the national survey on patient satisfaction of public hospital services that are meaningful for other health systems to consider.

Methods

Extracting Data from the Annual NPHPSS for Shandong Province Between 2019 and 2021

Data were extracted from the NPHPSS of 148 out of 600 public hospitals in Shandong Province. These 148 hospitals were retained because they met the following criteria: no less than 400 completed questionnaires were received (defined by NPHSS as a minimum number) from the same hospital in three consecutive years of 2019, 2020 and 2021 (when the sample size reaches 400, the decrease in sampling error is no longer significant with the increase in sample size). That is, any additional screening was not performed on the 148 hospitals when they meet the criteria to avoid selection bias.

The survey included questions relevant to the patient experience of care for outpatients (n = 18) and inpatients (n = 23). Based on the HCAHPS[30] and patient experience varieties, data generated from the questions were put into different dimensions as detailed in Table 1.

Categorization of Hospitals

In China, Public Hospitals are Categorized Using the Following Five methods

1) By nationally defined levels and grades – representing the service scale and capacity of a hospital.

Higher level indicates bigger service scale and capacity of the hospital (III > II > I). Hospital in the same level can be further categories into A or B grade based on the overall service performance (A > B).

2) By supervision level – signifying the affiliated authorities and their strength of support to a hospital.

Usually, provincial hospitals receive more financial or policy support than municipal and county hospitals, including government special finance, preference of construction land etc.

3) By economic level – using the per capita GDP of the area where the hospital locates.

This includes the following four levels based on GDP per capita: very developed (cities with GDP per capita in the first quarter), developed (cities with GDP per capita in the second quarter), under developed (cities with GDP per capita in the third

Table 1 Dimensions of Questionnaires

Target population	Dimension	Question in the questionnaire
Outpatient	a. Registration	Q3, Q4, Q5
	b. Communication with nurses	Q9, Q10, Q11
	c. Communication with doctors	Q6, Q7, Q8
	d. Hospital environment and display signs	Q12, Q13, Q14, Q15
	e. Responsiveness of hospital staff	Q17
	f. Individual privacy	Q16
Inpatient	a. Communication with nurses	Q1, Q2, Q3
	b. Communication with doctors	Q5, Q6, Q7
	c. Procedures for admission and discharge	Q18, Q19, Q21, Q22
	d. Pain management	Q12
	e. Communication about medicines	Q13, Q14, Q15
	f. Hospital environment and display signs	Q8, Q9, Q10
	g. Meal quality	Q16
	h. Responsiveness of hospital staff	Q4
	i. Attitude of medical staff towards relatives and friends	Q17

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quarter) and poorly developed (cities with GDP per capita in the last quarter).[40]

4) By hospital service types – representing patient cohorts served by the hospital which include general hospitals, specialized hospitals, Traditional Chinese Medicine (TCM) hospitals and Maternal and Child Health (MCH) Institutions.
5) By rating the health information management system of the hospital.

The National Health Commission rates the hospital health information management system (HIMS) based on its Electronic Medical Records Adoption Model covering the complete medical processes such as outpatient, ward, examination and testing, treatment, medical insurance, medical records, etc.[41] The model consists of 0–8 levels. Higher the rating level indicates the more advanced HIMS adopted by the hospital.

Scoring Method and Statistical Analysis

Each survey question received a score between 1 and 4 with 4 representing the highest level of satisfaction. For each dimension as in Table 1, the score of each question was converted to a standard score for homogenous comparison, as showed in the below formulas. Statistical analysis was performed using IBM SPSS Statistics 22 statistical software. One-way ANOVA was employed to scrutinize the differences in average satisfaction scores, serving across multiple independent samples. When heterogeneity of variance existed, the Welch test was used instead of one-way ANOVA. Pearson test was applied to evaluate the relationship between continuous variables, particularly for outpatient and inpatient satisfaction scores. Conversely, the correlation between classified variables and continuous variables was evaluated by the Spearman test, with patient satisfaction scores as continuous variables and categories of hospitals as classified variables. A univariate linear regression model was established to describe the impact of variables on satisfaction. When $p \leq 0.05$, it indicates a statistical difference. The calculation formulas of score conversion:

$$\text{Score of each question} = \frac{\textit{The point of selected option} - \textit{Min}}{\textit{Max} - \textit{Min}} * 100$$

For example, if the point scope is 1–4 (Max = 4, Min = 1), the patient chose the 3-point option and the converted score of the question was 66.66.

$$\text{Score of each questionnaire} = \frac{\textit{Sum of question scores}}{\textit{Number of questions}}$$

$$\text{Score of each hospital} = \frac{\textit{Sum of questionnaire scores}}{\textit{Number of questionnaires}}$$

Results

In total, patient survey data of 148 hospitals that met the selection criteria was included in the study. Detailed categories of 148 hospitals were shown in Table 2.

The ratings of Health Information Management System (HIMS) of hospitals changed over the three-year period. In 2019, the average rating of HIMS in 148 hospitals was 2.96 with 28.4% (n = 42) of hospital receiving a rating lower than 3; 41.9% (n = 62) of hospitals receiving a rating of 3; 27.7% (n = 41) of hospital receiving a rating of 4 and 2.0% (n = 3) hospitals with a rating ≥5 respectively. In 2020, there was a slight increase in the average rating of 3.35 and change in the proportion of hospitals in the 4 rating groups: <3–14.2% (n = 21), 3–37.8% (n = 56), 4–45.3% (n=67), and ≥5–2.7% (n = 4). In 2021, the average rating continued to improve to 3.75 and the proportion of hospitals in these 4 rating groups were 1.4% (n = 2), 27.7% (n = 41), 66.2% (n=98) and 4.7% (n = 7).

Table 2 Detailed Categories of 148 hospitals

Characteristics	No.	Proportion	Characteristics	No.	Proportion
a. Grade			**c. Economic level of location**		
IIIA	96	64.9%	Very developed	73	49.3%
IIIB	26	17.6%	Developed	29	19.6%
IIA	23	15.5%	Less developed	22	14.9%
IIB	3	2.0%	Poorly developed	24	16.2%
b. Level of supervision			**d. Type**		
Provincial	24	16.2%	General	77	52.0%
Municipal	71	48.0%	Specialized	28	18.9%
County	53	35.8%	TCM	34	23.0%
			MCH	9	6.1%

Temporal Trends and Scores of Patient Satisfaction

The outpatient satisfaction showed an annual upward trend with Welch test (p=0.000), as well as the satisfaction in each dimension by one-way ANOVA (p=0.000). For outpatients, the dimension of "communication (with nurses or doctors)" received the highest satisfaction score, while "registration" and "hospital environment and display signs" obtained the lowest scores in all periods.

For the inpatient survey, significant differences were found by One-way ANOVA (p=0.000), except for the dimension of attitude towards relatives and friends (p=0.24). Annual improvement in inpatient satisfaction on five out of seven dimensions was found, other than "meal quality" and "attitude of medical staff towards (patients') relatives and friends". The inpatient satisfaction in meal quality showed a significant increase in 2020 followed by a decrease in 2021. Satisfaction in "attitude of medical staff towards (patients') relatives and friends" for inpatients had no significant changes during different periods. Both of the dimensions of "responsiveness of hospital staff" and "communication (with nurses or doctors)" for inpatient received the highest scores and "procedures for admission and discharge" and "meal quality" received the lowest scores from 2019 to 2021.

Correlation Between Outpatient and Inpatient Satisfaction

The correlation between outpatient and inpatient satisfaction was explored by Pearson test. The results showed that outpatient satisfaction was positively and significantly correlated with inpatient satisfaction in the three periods (2019, r = 0.444, p = 0.000; 2020, r = 0.387, p = 0.000; 2021, r = 0.292, p = 0.000).

Differences in Satisfaction Between Outpatients and Inpatients in Communication-Related Dimensions

The following three dimensions are included in both of the questionnaires for outpatients and inpatients: 1) communication with doctors, 2) communication with nurses, and 3) responsiveness of hospital staff. The details of scores in the three dimensions, as showed in Figure 1.

Although both outpatient and inpatient satisfaction in the three dimensions of communication has achieved annual improvement, the satisfaction scores received from inpatients were higher than that of outpatients by Welch test (p=0.000). In terms of improvement amplitude, outpatient satisfaction in the responsiveness of hospital staff was always higher than that of inpatients by Welch test (2019–2020, outpatient vs inpatient = 3.69% ± 5.01% vs 1.06% ± 1.87%, p=0.000; 2020–2021, outpatient vs inpatient = 1.59% ± 6.06% vs 0.26% ± 2.58%, p = 0.015). Amplitude difference in the satisfaction of communication with doctors or nurses between outpatients and inpatients was reflected in 2019–2020 (communication with doctors, outpatient vs inpatient = 2.10% ± 3.37% vs 1.01% ± 2.09%, p=0.001; communication with nurses, outpatient vs inpatient = 1.63% ± 3.06%vs 0.99%±1.98%, p=0.031), but absent in 2020–2021 (communication with doctors, outpatient vs inpatient = 0.95% ± 3.66% vs 0.32% ± 2.61%, p = 0.088>0.05; communication with nurses, outpatient vs inpatient = 0.88% ± 3.37% vs 0.31% ± 2.88%, p = 0.12>0.05) by Welch test.

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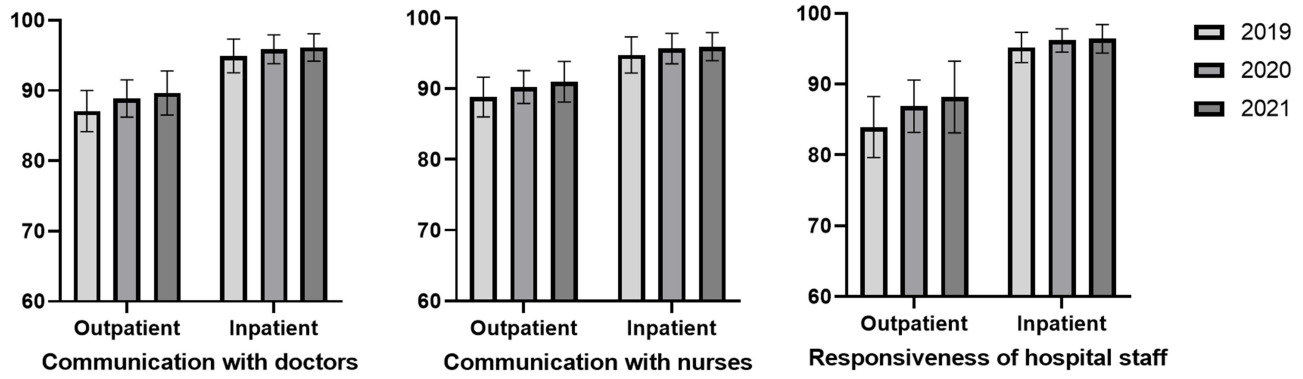

Figure 1 Scores across communication-related dimensions for outpatients and inpatients.

Comparison of Satisfaction in Hospital Environment and Display Signs Between Outpatients and Inpatients

Both outpatient and inpatient satisfaction in hospital environment and display signs have achieved annual improvement. Outpatients gave lower satisfaction scores than that of received from inpatients in hospital environment and display signs through Welch test ($p = 0.000$). The comparison of the annual improvement rates found that the level of improvement of outpatient satisfaction was greater than that of inpatients by Welch test (2019–2020, outpatient vs inpatient = 3.27% ± 3.63% vs 1.96% ± 2.78%, p = 0.001; 2020–2021, outpatient vs inpatient = 1.2% ± 4.07% vs 0.33% ± 2.87%, $p = 0.023$). The details were showed in Table 3.

Correlation Between Patient Satisfaction and Hospital Category

The correlation between patient satisfaction and various hospital categories was examined using the Spearman test. As depicted in Tables 4 and 5, the correlation between patient satisfaction and hospital categories became increasingly evident over the survey period for both outpatients and inpatients.

Table 3 Satisfaction Scores in Hospital Environment and Display Signs

	2019	2020	2021
Outpatient	82.77 ± 3.12	85.41 ± 3.04	86.44 ± 3.54
Inpatient	89.27 ± 2.44	90.98 ± 1.95	91.25 ± 2.47

Note: all values were represented by mean ± standard deviation (*X*±SD).

Table 4 Correlation of Patient Satisfaction with Hospital Categories

Hospital Category	Outpatient Satisfaction	Inpatient Satisfaction
Grade and Level	Positive correlation with higher grades and levels for overall satisfaction and communication-related dimensions in 2019.	Positive correlation with higher grades and levels for overall satisfaction and communication-related dimensions in 2019–2021.
Level of Supervision	Higher supervisory levels associated with higher overall satisfaction and communication-related dimensions.	Higher supervisory levels associated with higher overall satisfaction and communication-related dimensions.
Economic Level of Location	Negative association with dimensions in responsiveness, registration, environment in 2020 and 2021.	Positive correlation with the dimension in environment in 2019–2021.

(*Continued*)

Table 4 (Continued).

Hospital Category	Outpatient Satisfaction	Inpatient Satisfaction
Type	Variations in outpatient satisfaction across hospital types, with MCH institutions receiving the highest satisfaction, followed by TCM hospitals and specialized hospitals, and comprehensive hospitals having the lowest in 2021.	No significant differences in inpatient satisfaction across hospital types.

Table 5 The Correlation of Hospital Category and Patient Satisfaction

Category		Total		Communication with nurses		Communication with doctors		Responsiveness of hospital staff		Hospital environment and display signs	
		R	*P*	R	*P*	R	*P*	R	*P*	R	*P*
Nationally defined levels and grades	Outpatient										
	2019	0.083	0.319	0.073	0.376	0.134	0.106	0.005	0.954	−0.127	0.124
	2020	0.128	0.121	0.075	0.363	0.091	0.273	0.010	0.904	−0.055	0.503
	2021	0.209	0.011*	0.196	0.017*	0.187	0.023*	0.100	0.226	−0.004	0.962
	Inpatient										
	2019	0.254	0.002**	0.237	0.004**	0.200	0.015*	0.198	0.016*	0.1	0.227
	2020	0.189	0.022*	0.198	0.016*	0.129	0.119	0.199	0.015*	0.143	0.083
	2021	0.239	0.003**	0.18	0.029*	0.152	0.066	0.081	0.326	0.048	0.559
Supervision level	Outpatient										
	2019	0.077	0.352	0.087	0.29	0.109	0.187	0.046	0.577	−0.163	0.048*
	2020	0.132	0.111	0.090	0.276	0.075	0.367	0.073	0.380	−0.112	0.174
	2021	0.260	0.001**	0.198	0.016*	0.168	0.042*	0.059	0.477	−0.057	0.495
	Inpatient										
	2019	0.261	0.001**	0.185	0.024*	0.183	0.026*	0.17	0.039*	0.059	0.473
	2020	0.158	0.054	0.183	0.026*	0.143	0.026*	0.181	0.028*	0.06	0.472
	2021	0.27	0.001**	0.194	0.018*	0.161	0.051	0.129	0.119	0.02	0.807
Economic level	Outpatient										
	2019	0.126	0.127	0.104	0.21	0.05	0.549	0.104	0.211	0.143	0.083
	2020	0.039	0.642	0.056	0.496	0.018	0.826	0.21	0.010*	0.244	0.003**
	2021	0.121	0.143	0.184	0.025*	0.184	0.025*	0.282	0.001**	0.307	0**
	Inpatient										
	2019	0.038	0.644	−0.094	0.254	−0.09	0.279	−0.045	0.587	−0.194	0.018*
	2020	0.06	0.466	−0.082	0.323	−0.053	0.525	0.02	0.813	−0.169	0.040*
	2021	0.06	0.468	−0.103	0.212	−0.112	0.176	0.013	0.871	−0.018	0.832
Hospital service types	Outpatient										
	2019	0.068	0.41	0.081	0.331	0.219	0.008**	0.096	0.244	0.005	0.954
	2020	0.090	0.275	0.231	0.005**	0.344	0**	0.238	0.004**	0.138	0.094
	2021	0.237	0.004**	0.138	0.095	0.244	0.003**	0.272	0.001**	0.111	0.178
	Inpatient										
	2019	0.073	0.376	−0.098	0.235	−0.081	0.33	−0.015	0.853	−0.018	0.832
	2020	−0.077	0.355	−0.016	0.843	0.02	0.807	−0.028	0.737	−0.005	0.955
	2021	−0.017	0.839	−0.069	0.408	−0.041	0.622	−0.13	0.114	−0.034	0.683

Notes: *means the *P* value <0.05; **means the *P* value <0.01; R signifies the correlation coefficient in the Spearman test. This table only showed common dimensions for outpatients and inpatients.

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Impact of the Healthcare Information Management System on Patient Satisfaction

A linear regression model was applied to evaluate the potential impact of HIMS implemented in hospitals on patient satisfaction. The results showed that HIMS had a significantly positive effect on the overall satisfaction of inpatients ($\beta = 0.172$, p=0.036), especially on the communication-related dimensions (communication with nurses, communication with doctors and responsiveness of hospital staff) in 2021 ($p < 0.05$), as showed in Table 6, which was not seen in 2019 and 2020. No obvious positive impact was found on outpatient satisfaction, which is shown in Table 6.

Discussion

Value of System-Wide Patient Satisfaction Survey

Many countries, especially developed countries, have implemented the systematic measurement of patient experience as an essential tool for monitoring healthcare system performance,[14] for public option or reimbursement allocation, but its wider application is not explored. Several studies have conducted extensive satisfaction surveys across China,[42] however, these efforts are confined to cross-sectional analyses and fail to predict the improvement of medical services through longitudinal assessments of patient satisfaction. Our study has demonstrated the values of conducting a standardized and system-wide annual patient satisfaction survey in understanding the state of service quality and effects of quality improvement in public hospitals and provided evidence to guide the development of quality improvement strategies at the system level.

Prediction of Benefits of Quality Improvement Initiatives

Countries globally are actively engaged in efforts to enhance the quality and efficiency of healthcare services, curtail healthcare expenditure, and elevate overall patient experience within the healthcare system.[43] Since late 1990s, medical disputes and tensed relationship between clinicians and patients have been one of the major threats to quality of hospital care provision in China.[44] Such concerns still remain,[45] despite significant expansion including bed, scope and service complexity provided by public hospitals to improve accessibility of hospital services in the face of growing and aging population.[46] Transforming the volume-driven hospital service system into high-quality care system is the key challenge that the Chinese government is facing.[47] The improved patients' satisfaction in their experience during the care process and interaction with clinicians in majority of the public hospitals in Shandong Province as recorded by the NPHPSS is an encouraging finding. This is an indication of positive effects and benefits of Chinese government's policies/initiatives in improving quality of care since 2018.[36] And these initiatives are the part of quality improvement strategies and health reform agenda under the "13th Five-Year Development Plan (2016–2020)"[48] and "Healthy China 2030".[49]

In addition, our study argues the value of formally including patient satisfaction as part of the evaluation of public hospital performance in China. In practice, it could be the inclusion of the results of annual NPHPSS into the performance index of high-quality and value-based service delivery to guide allocation of health insurance funds or health expenditure. Similar experiences can be learnt from United States,[30] England[31] and other OECD countries where patient experience has been accepted as an important component of quality of care.[14,47] Establishing and implementing national-wide patient satisfaction survey as NPHPSS is a worthwhile investment.

Possible Reasons for Improved Patient–Clinician Interaction

Patient–physician communication has long been found to play an important role in patient-centered care and patient satisfaction.[50] Effective patient-physician communication and positive attitude of medical staff would significantly improve overall patient's satisfaction.[42,51] Our findings indicate that there have been significant improvements in patient satisfaction with clinicians' communication skills and their interactions with medical staff, reflecting a continuous enhancement in these areas. The Chinese government has adopted a people-centered integrated care approach (PCIC)[52] to improve the professional attitude of medical staff toward patients. A special department has been established in all public hospitals to address patients' complaints guided by the Regulation on the Prevention and Handling of Medical Disputes since 2018.[53] In addition, official channels like the hotline 12345 are effectively utilized to offer patients and their families a public yet confidential avenue for feedback.[54,55] The number of complaints received and outcomes of complaints is included as part of the annual medical

Table 6 The Effect of HIMS Levels on Patient Satisfaction

Outpatient	Total		Communication with nurses		Communication with doctors		Responsiveness of hospital staff		Hospital environment and display signs		Registration		Individual privacy							
	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*						
2019	0.025	0.761	0.075	0.362	0.049	0.551	−0.006	0.939	−0.013	0.878	0.117	0.156	0.078	0.347						
2020	0.030	0.716	−0.011	0.892	−0.067	0.416	−0.086	0.301	−0.071	0.388	0.023	0.780	−0.016	0.850						
2021	0.034	0.681	−0.025	0.767	−0.028	0.740	−0.165	0.045*	−0.040	0.631	−0.048	0.564	−0.057	0.491						
Inpatient	**Total**		**Communication with nurses**		**Communication with doctors**		**Responsiveness of hospital staff**		**Hospital environment and display signs**		**Procedures for admission and discharge**		**Attitude of medical staff towards relatives and friends**		**Pain management**		**Communication about medicines**		**Meal quality**	
	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*	Beta	*P*
2019	0.003	0.970	0.130	0.116	0.121	0.142	0.098	0.234	0.099	0.229	0.002	0.977	−0.019	0.822	0.097	0.240	−0.017	0.837	−0.017	0.841
2020	0.160	0.052	0.114	0.167	0.083	0.317	0.081	0.330	0.166	0.043	−0.022	0.789	−0.093	0.263	0.071	0.390	0.041	0.620	−0.042	0.613
2021	0.172	0.036*	0.227	0.006*	0.213	0.009**	0.206	0.012*	0.139	0.092	0.071	0.388	−0.050	0.546	0.187	0.023*	0.110	0.183	−0.134	0.105

Notes: *means the *p* value <0.05; ** means the *p* value <0.01; Beta signifies the standard regression coefficient in the univariate linear regression model.

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ethics assessment of medical staff which directly affects their incomes.[56] The number of medical violence decreased from 3,202 in 2018 to 427 in 2021 in China,[57] and the number of medical malpractice evaluation reduced by 36.7% from 2017 to 2021 in Shandong Province.[58] These effective strategies can serve as a benchmark for other countries to enhance patient–clinician interactions, particularly for nations with a universal healthcare system akin to that of China.

Variation of Patient Experience in Inpatient and Outpatient Care

In China, primary healthcare services are vastly provided at the outpatient departments in public hospitals where long waiting and overcrowding are the norm.[42] Although the outpatient visits account for 95% of the total hospital service volume per year,[46] more than 60% of growth in health expenditure is estimated to be in inpatient services and social insurance systems in China that favor inpatient over outpatient care.[47] Li et al (2020) systematically reviewed outpatient satisfaction in tertiary hospitals in China and found "environment" and "procedures" were the two areas least satisfied by outpatients,[27] which were consistent with our findings of the current study that "registration" and "hospital environment and display signs" received the lowest scores amongst outpatients.

As a gate keeper to hospital inpatient services, improving efficiency and reducing waiting time for outpatient are critical to improve the overall patient experience of care and to prevent immature admission to inpatient care.[59] This ultimately reduces the medical costs and financial burden to both public hospitals and patients. Intelligent devices and technologies such as online appointment and registration system should be introduced to further improve the experience of outpatients.[60,61] A significant revelation of our research is the discernible positive correlation observed between outpatient and inpatient satisfaction. This underscores the necessity for healthcare providers to prioritize the consistency and integration of healthcare services. However, there is currently a lack of consensus among various studies regarding the determinants of satisfaction for both outpatient and inpatient services. It is recommended that future research should expand the sample size and conduct differential analyses based on the characteristics of patient populations, which may assist service providers in gaining a more holistic understanding of the weaknesses and issues in patient experience.

Proven Value of Health Information Management System in Improved Patient Experience

Health Information Technology (HIT) has consistently been a focal point in the research and development of modern healthcare services.[62] The positive effects of HIT or digitization have been revealed in the quality of medical care providers and patient satisfaction.[63] Health Information Management Systems (HIMS) is the information systems that integrate clinical and administrative applications in hospitals with HIT.[64] The effect of standardized and graded HIMS on patient satisfaction has not been researched before. One of the pivotal findings of our study is the significant positive correlation between the advancement of HIMS across hospitals and the improvement of inpatient satisfaction. This suggests that the integration and consistency of healthcare services, as facilitated by HIMS, play a crucial role in enhancing patient satisfaction.

Higher-level HIMS indicate higher user-friendliness, shorter waiting times, better informed treating doctors, and smooth patient discharge processes, which likely positively influence patient satisfaction.[63] More than one-third of the hospitals received a low HIMS score in the results, indicating an urgent need for investment in HIMS upgrades based on our findings. While upgrades are necessary, the high operating and maintenance costs of HIMS also need to be addressed. For example, in United States, the annual cost for IT software and implementation in healthcare is estimated to be nearly US$4 trillion.[65] Government investment in improving the overall HIMS across public hospitals, particularly the more disadvantaged hospitals, is required. It is essential to further analyze the economic cost-effectiveness of such investments.

The study also found a correlation between patient satisfaction and hospital types, location and patient cohorts with differing socio-economic status, which is implied in previous studies conducted in Chinese public hospitals by Hu et al[66] and Liu et al,[67] although the specific outcomes show some inconsistencies. This clearly indicates that one-size fits all quality improvement strategies may not generate continuous and consistent improvement across hospital and the public hospital sector. These findings underscore the need for a broader and more scientifically rigorous assessment system to validate these relationships and to provide a comprehensive understanding of how various hospital attributes impact patient satisfaction.

Limitations

The strength of the study is the ability in obtaining survey results for each of the questions included in the national survey from a large number of hospitals in a three-year period. The limitation was the inability to access the survey raw data for further analysis and testing due to the concerns of data integrity and confidentiality.

Conclusion

Patient satisfaction is an important indicator of quality of care which has been widely adopted as an effective means in understanding patient's experience and perception of care. By analyzing data collected from the annual national patient satisfaction survey in a large number of hospitals in three consecutive years, the current study has provided evidence to demonstrate the value of system-wide annual patient satisfaction survey in evaluating patient's experience of care and predicting the effects of quality improvement initiatives in public hospitals. The findings indicate that strategies in improving overall patient experience of care in hospitals should take into consideration and address the differing needs between inpatient and outpatient. At the system level, initiatives to improve the quality of care across public hospitals should tailor to local hospital contexts, including hospital types, geographic location and differing patient cohorts. Furthermore, the study supports that investment in upgrading health information management system in hospitals can result in the improvements of quality care provision and patient experience.

Data Sharing Statement

All data generated or analyzed during this study are included in this published article.

Ethical Approval

The research was conducted a thorough ethical review through the Institutional Review Board of Shandong Provincial Maternal and Child Health Care Hospital Affiliated to Qingdao University, China. It was found to comply with all relevant ethical requirements for human-related scientific research and has been granted Research Ethics Committee Approval of Shandong Provincial Maternal and Child Health Care Hospital Affiliated to Qingdao University (Approval Number: No.2024-101).

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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Disclosure

The authors declare that they have no competing interests.

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