



Relationship between inpatient satisfaction and the quality of surgery

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Background: This study sought to investigate the correlation between inpatient satisfaction and surgical quality evaluation indicators, and explore the factors affecting inpatient satisfaction.

Methods: A total of 5,000 inpatients who underwent surgery at 10 tertiary. A hospital in Chongqing were randomly selected and asked to complete an inpatient satisfaction questionnaire developed by our team in a previous study. A logistic regression was undertaken to analyze the factors affecting inpatient satisfaction, and the relationship between inpatient satisfaction and evaluation indicators of surgical quality.

Results: The overall satisfaction level of inpatients undergoing surgery was high. Specifically, the satisfaction level was 88.7%, and the dissatisfaction level was 11.3%. A univariate analysis showed that age, marital status, education level, monthly family income, the source of medical costs, the average length of the hospital stay, first hospitalization or not, doctor-patient communication, the quality of surgery, service attitude, 30-day postoperative mortality, major and minor complications, the rescue failure rate, readmission, and the incision infection rate affected the patient satisfaction, and the difference between satisfied and dissatisfied patients in each group was statistically significant (all $P=0.000$). The results of the logistic regression analysis showed that the factors related to the satisfaction of surgical quality indicators were postoperative 30-day mortality, major and minor complications, the rescue failure rate, the incision infection rate, and the average length of the hospital stay (all $P<0.05$), and the factors related to a decrease in inpatient satisfaction were increased postoperative 30-day mortality, a high incidence of major and minor complications, a high rescue failure rate, and a high incision infection rate.

Conclusions: There was a significant correlation between inpatient satisfaction and surgical quality evaluation indicators (i.e., 30-day mortality, major and minor complications, the rescue failure rate, the incision infection rate, and the average length of the hospital stay).

Keywords: Inpatient satisfaction; inpatients; surgery; quality indicators

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Introduction

Patient satisfaction is defined as “the response of health care recipients to the relevant content, processes, and outcomes of their service experience” (1). With the advancement of the reform of the national medical and health system, patient satisfaction questionnaires have become new tools for evaluating the service quality of medical service institutions (2). Under the notice of the medical service action plan [2018–2020] issued by the National Health and Family Planning Commission, patient satisfaction is an important indicator for measuring the service quality of medical and nursing services (3,4). As the notice states, “*The patient satisfaction evaluation is included in the comprehensive performance evaluation of medical and health institutions as an important indicator and used as the evaluation to improve the implementation effect of the medical service action plan.*” (3,4).

The satisfaction of inpatients with the quality of medical services is also particularly important (5). Surgical departments have one of the highest number of inpatient admissions of hospital departments, and the satisfaction of surgical patients largely reflects the overall quality of hospitals (6). An increasing number of surgical procedures monitor the quality of their services through patient satisfaction measures (7). To determine whether the needs of patients have been met, this study examined 10 tertiary A hospitals in Chongqing to analyze the factors affecting the satisfaction of inpatients, and to explore the relationship between the satisfaction of inpatients and surgical evaluation indicators. Hospitals can use the results to improve the quality of comprehensive surgery, and thus improve the satisfaction of inpatients.

We present the following article in accordance with the SURGE reporting checklist (available at <http://dx.doi.org/10.21037/gS-21-289>).

Methods

Study subjects

In this study, based on Chongqing’s medical service architecture and distribution, 10 tertiary A hospitals in Chongqing were selected as the study units using a stratified sampling principle, and 5,000 hospitalized surgical patients at these hospitals were randomly selected as the study subjects. To be eligible to participate in this study, patients had to meet the following inclusion criteria: (I) have been hospitalized for more than 3 days; (II) be in a stable

condition; and (III) they had to be willing to participate in the questionnaire, and sign the Informed Consent Form. A total of 5,000 questionnaires were randomly distributed, and 4,665 valid questionnaires were returned; thus, there was a response rate of 93.3%. *Figure 1* shows the flow chart of study subject deletion and selection. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by ethics board of Army Medical University (No.: IRB-2019-12) and informed consent was taken from all the patients.

Investigation and analysis methods

A questionnaire on inpatient satisfaction, which had been developed by our team in a previous self-study, was used and distributed to the 10 selected tertiary A hospitals to conduct an on-site questionnaire with hospitalized surgical patients, who were asked to complete the questionnaire. The questionnaire comprised two parts: (I) a general data part; and (II) the inpatient satisfaction part. Part 1 gathered data about the general situation of inpatients, including data about gender, age, marital status, education level, occupation, monthly income, hospitalization costs, and payment methods. Part 2 gathered data about inpatients’ satisfaction, including data about inpatients’ satisfaction with the medical environment, medical facilities, logistics services of the ward, medical technology, service attitude, doctor-patient communication, medical charges, medical ethics, and treatment effect. The satisfaction questionnaire developed in this study used a 5-point “Likert scale” (8,9) (on which 1= very dissatisfied, 2= dissatisfied, 3= neutral, 4= satisfied 5= very satisfied). For statistical convenience, “very satisfied” and “satisfied” were combined into “satisfied” (mean score ≥ 4 points) and “neutral”, “dissatisfied” and “very dissatisfied” were combined into “dissatisfied” (mean score < 4 points). To ensure the quality of the questionnaire, the investigators who attended each of the hospitals received systematic training, distributed the questionnaire immediately, collected the questionnaire immediately after its completion, and answered questions on the spot.

The primary variables of this study were divided into three categories: (I) the demographic and sociological characteristics of inpatients; (II) hospitalization perceptions; and (III) the quality of surgery. The quality of surgery mainly related to 30-day postoperative mortality, major and minor complications, the rescue failure rate, readmission,

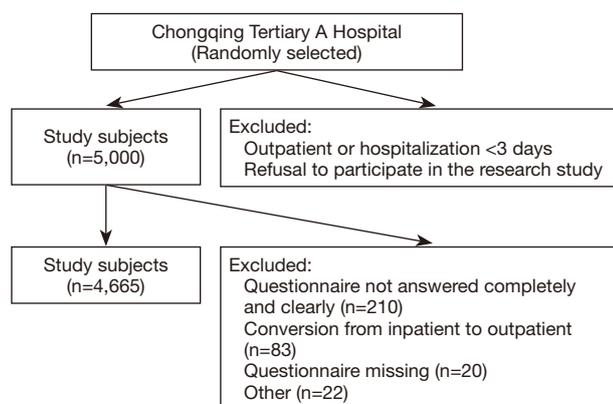


Figure 1 Study subject selection flow chart.

and the incision infection rate.

Statistical analysis

SPSS 19.0 statistical software was used for the data entry and analysis. The enumeration data were expressed as a (%). A univariate analysis of patients' demographic sociological characteristics, hospitalization perceptions and the effects of the surgical quality on overall satisfaction was undertaken using a chi-square test. A multivariate analysis of the factors affecting satisfaction was undertaken via a logistic regression analysis. A $P < 0.05$ was considered statistically significant.

Results

General data

The basic characteristics of the general data of the hospitalized surgical patients in the investigated areas were analyzed (see *Table 1*). The results showed that 2,556 (54.79%) patients were male and 2,109 (45.21%) were female. In relation to age, 12.58% of the patients were <18 years old, and 64.78% were 18–60 years old; thus, the latter age group accounted for a relatively high proportion of patients. The proportion of inpatients with a monthly family income of <1,000 RMB, 1,000–3,000 RMB, 3,000–5,000 RMB, and >5,000 RMB was 7.80%, 39.70%, 24.97%, and 27.52%, respectively. In terms of the source of hospitalization costs, medical insurance accounted for the highest proportion (35.67%), followed by commercial insurance (23.21%), rural cooperative medical care

Table 1 General data of inpatients at 10 tertiary A hospitals in Chongqing

Item	Number (N)	Percent (%)
Sex		
Male	2,556	54.79
Female	2,109	45.21
Age (years)		
<18	587	12.58
18–60	3,022	64.78
60+	1,056	22.64
Marital status		
Unmarried	1,073	23.00
Married	2,101	45.04
Widowed	316	6.77
Divorce	1,175	25.19
Education level		
Junior high school and below	1,804	38.67
High school or specialty	1,969	42.21
Bachelor degree or above	892	19.12
Occupation		
Public position	559	11.98
Enterprise	1,302	27.92
Farmer	1,359	29.14
Worker	1,005	21.54
Individual	212	4.54
Other	228	4.89
Monthly household income		
<1,000 RMB	364	7.80
1,000–3,000 RMB	1,852	39.70
3,000–5,000 RMB	1,165	24.97
>5,000 RMB	1,284	27.52
Sources of hospital costs		
Rural cooperation	989	21.20
Medicare	1,664	35.67
Commercial Insurance	1,083	23.21
Completely self-paid	658	14.11
Other sources	271	5.81

Table 2 Questionnaire results of overall satisfaction of inpatients and satisfaction in all dimensions

Satisfaction	Satisfied, n (%)	Dissatisfied, n (%)	P value
Overall satisfaction	4,138 (88.7)	527 (11.3)	
Medical environment	4,035 (86.5)	630 (13.5)	0.001
Medical facilities	4,161 (89.2)	504 (10.8)	0.448
Ward logistics services	4,217 (90.4)	448 (9.6)	0.008
Medical technology	4,259 (91.3)	406 (8.7)	0.000
Service attitude	4,147 (88.9)	518 (11.1)	0.768
Doctor-patient communication	3,979 (85.3)	686 (14.7)	0.000
Medical charges	4,175 (89.5)	490 (10.5)	0.219

P value refers to the statistical significance of satisfaction for each dimension and overall satisfaction.

(21.20%), complete self-pay (14.11%), and other sources (5.81%).

Analysis of inpatient satisfaction

Overall satisfaction and satisfaction across all dimensions

Table 2 shows the results of inpatients' overall satisfaction and satisfaction across all dimensions. From the results, it can be seen that the overall satisfaction rate was relatively high (88.7%). A comparison of the satisfaction results across all dimensions, showed that inpatients' level of satisfaction with medical technology and ward logistics services was high (more than 90%), while inpatients' level of satisfaction with doctor-patient communication was relatively low (85.3%).

Analysis of factors affecting inpatient satisfaction

Satisfaction of inpatients with different demographic and sociological characteristics

Of the inpatients sampled at the 10 hospitals in this study, there was no significant differences among the basic demographic characteristics in relation to gender and occupation; however, there were significant differences in relation to age ($\chi^2=44.678$, $P=0.000$), marital status ($\chi^2=41.929$, $P=0.000$), education level ($\chi^2=39.570$, $P=0.000$), monthly family income ($\chi^2=25.584$, $P=0.000$), source of medical costs ($\chi^2=44.970$, $P=0.000$), the average length of the hospital stay ($\chi^2=373.415$, $P=0.000$), and first hospital admission ($\chi^2=278.048$, $P=0.000$) (see Table 3).

Inpatient satisfaction with perceptions hospitalization

There was no significant difference in the perceptions of

hospitalization in terms of medical environment, medical facilities and ward logistics services; however, there were significant differences in the perceptions of hospitalization in terms of doctor-patient communication ($\chi^2=12.537$, $P=0.000$), surgical quality ($\chi^2=17.409$, $P=0.000$), and service attitude ($\chi^2=16.482$, $P=0.000$) (see Table 4).

Relationship between inpatient satisfaction and surgical quality indicators

In relation to the relationship between inpatient satisfaction and surgical quality indicators, there were significant differences in 30-day postoperative mortality, major and minor complications, the rescue failure rate, the readmission rate, and the incision infection rate (all $P=0.000$; see Table 5).

Logistic regression analysis of inpatient satisfaction

The overall satisfaction of inpatients was divided into binary dependent variables, such that "very dissatisfied," "dissatisfied," and "general" were set as 1, and comprised the dissatisfied group, and "satisfied" and "very satisfied" were set as 2, and comprised the satisfied group. A univariate analysis was undertaken to examine inpatient satisfaction in relation to inpatients' demographic sociological characteristics, hospitalization perceptions and the quality of surgery. 15 factors thought to affect overall inpatient satisfaction were used as independent variables, and defined and assigned values (see Table 6). A binary logistic regression analysis was also performed, the results of which are set out in Table 7.

As Table 7 shows, a variable with a level of $P=0.05$ was selected as the main influencing factor of the regression equation, and independent variables with a $P>0.05$ were excluded. 10 variables entered the regression equation. The logistic regression resulted in the following equation: $Y =$

Table 3 Relationship between inpatient satisfaction and characteristic data

Variable	Satisfied		Not satisfied		χ^2	P
	N	%	N	%		
Sex					3.190	0.074
Male	1,290	50.47	1,266	49.53		
Female	1,009	47.84	1,100	52.16		
Age (years)					44.678	0.000
<18	250	42.59	337	57.41		
18–60	1,436	47.52	1,586	52.48		
60+	610	57.77	446	42.23		
Marital status					41.929	0.000
Unmarried	529	49.30	544	50.70		
Married	1,151	54.78	950	45.22		
Widowed	140	44.30	176	55.70		
Divorce	514	43.74	661	56.26		
Education level					39.570	0.000
Junior high school and below	1,046	57.98	740	41.02		
High school or specialty	971	49.31	998	50.69		
Bachelor degree or above	434	48.65	458	51.35		
Occupation					7.139	0.210
Public position	286	51.16	273	48.84		
Enterprise	692	53.15	610	46.85		
Farmer	768	56.51	591	43.49		
Worker	555	55.22	450	44.78		
Individual	108	50.94	104	49.06		
Other	120	52.63	108	47.37		
Monthly household income					25.584	0.000
<1,000 RMB	159	43.68	205	56.32		
1000–3000 RMB	1,066	57.56	786	42.44		
3,000–5,000 RMB	645	55.36	520	44.64		
>5,000 RMB	681	53.04	603	46.96		
Sources of hospital costs					44.970	0.000
Rural cooperation	470	47.52	519	52.48		
Medicare	944	56.73	720	43.27		
Commercial insurance	527	48.66	556	51.34		
Completely self-paid	284	43.16	374	56.84		
Other sources	138	50.92	133	49.08		
Average length of stay (days)					373.415	0.000
≤7	1,812	84.99	320	15.01		
>7	1,500	59.22	1,033	40.78		
First admission or not					278.048	0.000
Yes	1,746	72.12	675	27.88		
No	2,046	91.18	198	8.82		

Table 4 Relationship between perception of hospitalization and patient satisfaction

Variable	Satisfied		Not satisfied		χ^2	P
	N	%	N	%		
Medical environment					1.875	0.171
Good	2,800	81.02	656	18.98		
Poor	1,001	82.80	208	17.20		
Medical facilities						
Good	2,816	81.48	640	18.52	2.369	0.124
Poor	1,009	83.46	200	16.54		
Doctor-patient communication					12.537	0.000
Good	2,890	86.45	453	13.55		
Poor	1,089	82.38	233	17.62		
Procedure quality					17.409	0.000
Good	2,136	68.59	978	31.41		
Poor	969	62.48	582	37.52		
Service attitude					16.482	0.000
Satisfied	2,210	71.36	887	28.64		
Not satisfied	1,028	65.56	540	34.44		
Ward logistics services					2.667	0.102
Satisfied	1,419	54.83	1,169	45.17		
Not satisfied	1,089	52.43	988	47.57		

$2.732 + 0.614X1 - 0.53X2 - 2.126X6 + 1.207X7 + 1.542X9 + 1.036X10 - 1.548X11 - 1.047X12 - 1.245X13 - 1.327X15$. Based on the regression coefficients of the independent variables in *Table 7*, it can be concluded that the main factors affecting inpatient satisfaction were the average length of the hospital stay (X6), postoperative 30-day mortality (X11), the quality of surgery (X9), the incision infection rate (X15), the rescue failure rate (X13), whether or not it was a first admission (X7), major and minor complications (X12), service attitude (X10), age (X1), and marital status (X2).

Discussion

Following the introduction of the patient-centered concept, questionnaires and studies on patient satisfaction have gradually increased both nationally and internationally (10-12). Notably, research on the relationship between the quality of surgery and patient satisfaction has attracted much attention (13-15); however, the relationship between

inpatient satisfaction and the quality of surgery has not been closely examined (16). Surgery plays an important role in surgical treatment, and can cause related complications and even lead to death. Thus, the issue of how to improve the quality of surgery has become an important area of research in this field (17).

In this study, we administered a random sampling questionnaire to inpatients at 10 tertiary A care hospitals in Chongqing, and analyzed and compared the various factors affecting inpatient satisfaction, and the relationship between inpatient satisfaction and the quality of surgery. The results showed that inpatients had a high overall level of satisfaction with hospitalization (88.7%), which is consistent with the high overall level of satisfaction (92.9%) found in the study by Smith *et al.* (18). There were some links between the demographic sociological characteristics of inpatients, their perceptions of hospitalization, factors related to the quality of surgical procedures, and the satisfaction of inpatients in this study. A univariate analysis revealed significant

Table 5 Quality of surgery and inpatient satisfaction

Variable	Satisfied		Not satisfied		χ^2	P
	N	%	N	%		
30-day postoperative mortality					431.420	0.000
≤5.6%	2,905	89.19	352	10.81		
>5.6%	893	63.42	515	36.58		
Major and minor complications					559.722	0.000
Postoperative bleeding	1,021	82.81	212	17.19		
Wound pain	459	44.82	565	55.18		
Anastomotic dehiscence	654	74.4	225	25.60		
Infection	665	49.52	678	50.48		
Other	164	88.17	22	11.83		
Rescue failure rate					352.112	0.000
≤5.0%	3,418	87.24	500	12.76		
>5.0%	440	58.90	307	41.1		
Readmission rate					960.185	0.000
≤10.0%	955	51.48	900	48.52		
>10.0%	2,567	91.35	243	8.65		
Wound infection rate					545.155	0.000
≤20.0%	1,996	86.48	312	13.52		
>20.0%	1,307	55.45	1,050	44.55		

Table 6 Independent variable value assignment table

Independent variable	Value assignment
Age (X1)	1= <18 years, 2= 18–60 years, 3= ≥60 years
Marital status (X2)	1= never married, 2= married, 3= widowed, 4= divorced
Education level (X3)	1= junior high school or below, 2= senior high school or specialist, 3= undergraduate or above
Monthly household income (X4)	1= <1,000 RMB, 2= 1,000–3,000 RMB, 3= 3,000–5,000 RMB, 4= >5,000 RMB
Source of medical cost (X5)	1= rural cooperation, 2= health insurance, 3= commercial insurance, 4= fully self-paid, 5= other sources
Average hospital stays (X6)	1= ≤7 days, 2= >7 days
First admission or not (X7)	1= yes, 0= no
Doctor-patient communication (X8)	1= good, 2= poor
Surgical quality (X9)	1= good, 0= poor
Service attitude (X10)	1= satisfied, 0= unsatisfied
Postoperative 30-day mortality (X11)	1= ≤5.6%, 2= >5.6%
Major and minor complications (X12)	1= postoperative bleeding, 2= wound pain, 3= anastomotic dehiscence, 4= infection, 5= other
Rescue failure rate (X13)	1= ≤5.0%, 2= >5.0%
Readmission rate (X14)	1= ≤10%, 2= >10%
Wound infection rate (X15)	1= ≤20.0%, 2= >20.0%

Table 7 Regression analysis of factors affecting inpatient satisfaction

Inclusion independent variables	Regression coefficient	Standard error	Wald	P	OR
Age (X1)	0.614	0.105	3.476	0.015	0.342
Marital status (X2)	-0.530	0.516	4.156	0.005	0.430
Education level (X3)	-1.836	0.322	2.207	0.712	1.021
Monthly household income (X4)	-2.078	0.489	2.196	0.860	0.673
Source of medical cost (X5)	-0.532	0.384	3.221	0.564	0.421
Average hospital stays (X6)	-2.126	0.223	1.417	0.045	0.724
First admission or not (X7)	1.207	0.375	2.346	0.026	0.913
Doctor-patient communication (X8)	-0.865	0.296	3.206	0.983	1.076
Surgical quality (X9)	1.542	0.387	3.764	0.000	1.212
Service attitude (X10)	1.036	0.104	1.598	0.002	0.879
Postoperative 30-day mortality (X11)	-1.548	0.322	3.154	0.001	0.971
Major and minor complications (X12)	-1.047	0.206	2.579	0.000	1.024
Rescue failure rate (X13)	-1.245	0.237	2.342	0.003	0.945
Readmission rate (X14)	0.025	0.347	1.965	0.067	0.985
Wound infection rate (X15)	-1.327	0.255	2.316	0.045	0.767
Constant	2.732	0.65	6.381	0.000	1.035

statistical differences in factors such as age, marital status, education level, family income, source of medical costs, the average length of the hospital stay, whether it was a patient's first admission or not, doctor-patient communication, the quality of surgery, service attitude, 30-day postoperative mortality, major and minor complications, the rescue failure rate, the readmission rate, and the incision infection rate.

The results of a logistic regression analysis indicated that the average length of the hospital stay, postoperative 30-day mortality, the quality of surgery, the incision infection rate, the rescue failure rate, whether it was a patient's first admission or not, major and minor complications, service attitude, age, and marital status had some effect on inpatient satisfaction. Among these, related indicators affecting the quality of surgery (i.e., the average length of the hospital stay, postoperative 30-day mortality, the incision infection rate, the rescue failure rate, and major and minor complications) were found to play an important role in the satisfaction regression equation. Thus, consistent with Greg *et al.*'s findings (19) that there was no significant relationship between readmission rate and satisfaction, a close relationship was found between the quality of surgery and inpatient satisfaction. Unlike the present study, Sacks *et al.*

did not find any significant relationship between satisfaction and major complications; however, Lobo Prabhu *et al.* found that 30-day readmission and patient satisfaction with complications were low (20). It should be noted that these findings may be related to other factors, such as different departments and differences in sample size.

A positive correlation was found between service attitude and patient satisfaction. Thus, hospitals should improve service attitudes and communication with patients to increase patient satisfaction. As Seleznev *et al.* observed, "patient satisfaction is a comprehensive embodiment of service performance of medical institutions and the service quality of medical institutions should be improved" (21). Consistent with the findings of Tehrani that older patients had higher levels of satisfaction than younger patients (22), a relationship was also found between inpatient satisfaction and basic characteristics, such as patient age and marital status. However, it should be noted that this is inconsistent with the findings of related studies (23), which have found low levels of satisfaction among patients older than 55 years.

Service attitude was also found to be a factor affecting the satisfaction of inpatients. Specifically, the results showed

that the better the service attitude, the higher the level of patient satisfaction. This finding is consistent with Shan's observation that the trust of medical institutions should be increased, and doctor-patient relationships should be a priority (24).

This study has a number of limitations. First, the relationship between satisfaction and surgical quality was only studied in inpatients at 10 tertiary A hospitals in Chongqing. Second, the sample size may also have some limitations. Third, only the satisfaction of inpatients was examined; thus, no comparisons could be made in relation to inpatients and outpatients. Future studies will seek to address this issue.

In summary, this study investigated the satisfaction of 5,000 inpatients at 10 tertiary A hospitals in Chongqing, and found that 88.7% of inpatients were generally satisfied with the hospitals they were in. The analysis showed that 3 factors were related (i.e., demographic characteristics, hospitalization perceptions, and surgical quality), and that there was a certain relationship between inpatient satisfaction and above factors. Among these factors, the average length of the hospital stay, postoperative 30-day mortality, major and minor complications, the rescue failure rate, and the incision infection rate in surgical quality indicators were particularly important in relation to patient satisfaction. Thus, hospitals should seek to improve surgical quality to increase the satisfaction of inpatients. The investigation and analysis of this paper provide some data on the relationship between inpatient satisfaction and surgical quality indicators, and could be used to improve the quality of medical and health institutions.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study involving human participants were in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by ethics board of Army Medical University (No.: IRB-2019-12) and informed consent was taken from all the patients.

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