

ORIGINAL ARTICLE

Analysis of day surgery implementation in a large public hospital from the perspective of high-quality development

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ABSTRACT

Objective and Methods: This study aimed to analyze the impact of day surgery on patients' medical expenses, length of hospital stay, medical service effectiveness, and medical experiences. Data collection and questionnaire surveys were conducted in patients undergoing day and non-day surgery in a sample hospital from 2019 to 2021. This study examined patients' baseline characteristics, waiting times for treatment, medical expenses, surgical effects and medical experience.

Results: The waiting time for treatment and medical expenses in the day surgery group was lower than those in the non-day surgery group. The day surgery group significantly outperformed the non-day surgery group concerning experience in medical convenience and accessibility. The differences were statistically significant ($P < 0.05$). **Conclusion:** Under the premise of ensuring medical quality and safety, day surgery implementation can reduce patients' waiting time for health service, alleviate the economic burden of inpatient surgery, and enhance their overall medical experience.

Key words: day surgery, management effectiveness, surgical management model, medical expense


INTRODUCTION

As Chinese society enters a new stage of high-quality development, Chinese individuals are increasingly demanding multi-dimensional and multi-level health services. Current hospital management in China needs to fulfill important objectives, including continuously optimizing the development mode and operation model of public hospitals, enhancing the efficiency of medical resource allocation, and elevating the level of refined hospital management while adhering to the principle of prioritizing individuals' health.^[1] Day surgery, as a new model to improve hospital operation and management effectiveness, has recently been widely advocated in hospitals in China, both locally and abroad. Day surgery refers to a management model where "patients complete admission, surgery, and discharge within one working day, excluding surgeries or procedures performed in

outpatient clinics".^[2] In China, day surgery is predominantly managed by a decentralized and extensive model. Currently, most domestic studies on day surgery are limited to basic theoretical analysis or are confined to exploring specific aspects such as process optimization and admission models. Systematic multidimensional evaluations and studies are uncommon. Owing to the uneven development and management levels of day surgery in hospitals across different regions, many hospitals lack understanding and motivation and face obstacles in promoting day surgery. Based on effectiveness management theory, this study included a representative large public hospital as the research sample, and compared the medical service effectiveness, medical expenses, length of hospital stay, and patient medical experience between day surgery and non-day surgery groups from two perspectives: medical operation efficiency and medical service effectiveness. This study

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aimed to analyze the implementation effectiveness of the day surgery management model and provide references for the management and development of day surgery in hospitals across various regions.

METHODS

Participants

This study selected day surgery and non-day surgery cases conducted in the departments piloting day surgery at a large public hospital between 2019 and 2021. The selected departments included ophthalmology, gastroenterology, otorhinolaryngology, and hand surgery, covering five disease/surgical types: cataract removal, tonsillectomy, vocal cord polyp removal, endoscopic colorectal polyp removal, and hand muscle release surgery. Given that patients aged ≥ 60 accounted for 72.83% of cataract-removal surgery in ophthalmology and patients aged ≤ 18 accounted for 60.91% in otorhinolaryngology, information bias was identified during the preliminary questionnaire survey. Consequently, patients undergoing gastrointestinal polyp surgery in Gastroenterology were selected as the participants for this study's questionnaire survey. Inclusion criteria for the survey sample were as follows: (1) patients in the day surgery group and those in the non-day surgery group who have undergone elective surgical treatment, and the disease/surgical types they underwent were included in the *Recommended Catalog of Day Surgery (Procedures) Pilot Diseases and Surgical Types* (hereinafter referred to as the *Recommended Catalog*) formulated by the National Health Commission; and (2) patients who were informed and willing to participate in the survey and could express themselves clearly. Exclusion criteria for the survey sample were as follows: To enhance the consistency of patient admission between the non-day surgery control group and the day surgery group, complex surgical cases other than those listed in the Recommended Catalog and cases with other malignant tumors, comorbidities, or complications that could exacerbate the disease burden were excluded from the day surgery and non-day surgery groups.

Measures

Operational efficiency of day surgery: The study variables include patients' general demographic characteristics and indicators such as preoperative length of hospital stay, length of hospital stay, and hospital expense. The preoperative length of hospital stay refers to the cumulative days ranging from the patient's admission to the surgery excluding the time spent on outpatient examinations. The general information survey indicators for the participants included sex, age, marital status, education level, occupation, income, payment method, type of visit, place of origin, and whether day surgery was performed.

Day surgery service effectiveness: Patients who underwent gastrointestinal polyp surgery in the gastroenterology department of the sample hospital in 2021 were randomly selected, with 215 cases each for day surgery and non-day surgery. Through a questionnaire survey of these 430 patients, data on the patients' medical experience across four dimensions—convenience of service, accessibility of service, pain perception, and satisfaction—under the two surgical management models, as well as postoperative bleeding and infection, were collected. Questionnaires of patients < 18 years of age or those unable to express themselves due to other reasons were completed by their guardians or family members. Based on the theoretical practice of this study and the research focus, the evaluation indicators of medical service effectiveness were conducted, forming a three-tier evaluation indicator system (Table 1).^[3]

This study adapted the widely used Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey^[4] from both domestic and international contexts. In conjunction with the primary research objectives of this study, some indicators were modified and adjusted. Relevant experts were consulted for multiple revisions to create a patient medical experience survey questionnaire suitable for this study. The questionnaire comprised two parts: patients' baseline characteristics and evaluations of their medical experiences.^[5] The section on patients' baseline characteristics included 17 questions, covering general information survey indicators, postoperative infection, and bleeding conditions.^[6,7] The evaluation of medical experience consisted of 15 questions, divided into four aspects: four items on the convenience of medical service, three items on the accessibility of medical service, four items on patients' pain perception, and four items on medical service satisfaction. A five-point Likert scale was used for all items in the medical experience evaluation section of the questionnaire. The scores ranged from 1 to 5, and all questions were rated in a positive direction. Before conducting the formal survey, the reliability of the questionnaire was tested. The Cronbach's α coefficient for the overall patient experience survey was 0.957, indicating excellent reliability. A total of 430 questionnaires were distributed and 417 valid responses were obtained, indicating a response rate of 96.98%.

Statistical analysis

The data were entered using EpiData 3.02 software with dual entry by two individuals. SPSS 12.0 statistical software was used for data processing and analysis. After testing for normality, measurement data with a normal distribution were presented as mean \pm standard deviation, and the independent sample *t*-test was used for comparison between the two groups. Non-normally

Table 1: Medical service effectiveness evaluation indicators

Primary indicators	Secondary indicators	Tertiary indicators
Operational efficiency indicators	Waiting time for treatment	Preoperative length of hospital stay and length of hospital stay.
	Medical expenses	Total hospital expenses, treatment costs, examination fees, nursing fees, bed charges, and medication costs.
Service effectiveness indicators	Surgical effect	Discharge outcome, unplanned reoperation, wound bleeding, and infection status.
	Convenience of service	Hospital procedures, admission procedures, discharge convenience, and timely response.
	Accessibility of service	Preoperative examinations, doctor/nurse-patient communication, and discharge guidance.
	Pain perception	Postoperative pain, anesthesia reaction, emotional reaction, and energy level.
	Satisfaction	Diagnosis and treatment techniques, nursing techniques, postoperative follow-up, and overall satisfaction.

distributed data were presented as median (interquartile range) $M(Q)$, and the Wilcoxon W test was used for comparison between the two groups. Enumeration data were presented as frequency (percentage), and group comparisons were made using the chi-square test or Fisher’s exact probability test. The reliability of the patient medical experience survey questionnaire was assessed using *Cronbach’s α* coefficient. The significance level (α) for all tests was set at 0.05.

RESULTS

Baseline characteristics of patients in the two surgical management models

A total of 2509 patients underwent day surgery, and 2886 patients underwent non-day surgery. The chi-square (χ^2) test indicated that there were no statistically significant differences between the two groups regarding sex, age, marital status, payment method, place of origin, and disease/surgical types ($P > 0.05$). The data from both groups were well-balanced and comparable (Table 2).

Medical expense in patients in the two surgical management models

The Wilcoxon W test was used to compare the differences in medical expenses between the two surgical management models. The results indicated that the medical expenses (total hospital expenses, treatment costs, examination fees, nursing fees, bed charges, and medication costs) in the day surgery group were lower than those in the non-day surgery group, and the differences were statistically significant ($P < 0.001$), as presented in Table 3.

Waiting time for treatment in the two surgical management models

The Wilcoxon W test was employed to compare the differences in waiting time for treatment between the two surgical management models. The results indicated that the waiting time (preoperative length of hospital

stay and length of hospital stay) in the day surgery group was shorter than that in the non-day surgery group, and the difference was statistically significant ($P < 0.001$), as presented in Table 4.

Service effectiveness for day surgery of digestive polyps

Surgical effectiveness in patients with digestive polyps: In the day surgery group and the non-day surgery group, the number of patients experiencing delayed postoperative bleeding was one and two, respectively, which were managed by endoscopic hemostasis. The discharge outcomes for improvement were 205 and 206 cases, respectively. Neither group experienced unplanned reoperation or postoperative infection. A comparison of the delayed postoperative bleeding and discharge outcomes between the two groups indicated that the differences were not statistically significant ($P > 0.05$), as presented in Table 5.

Patient experience for digestive polyps in the two surgical management models:

The results for the four dimensions of patient experience, namely convenience of service, accessibility of service, pain perception, and satisfaction, in the two surgical management models, are presented in Table 6. The differences between the two groups in different surgical management modes were statistically significant ($P < 0.001$). The patient experience scores concerning convenience, accessibility, pain perception, and satisfaction were higher in the day surgery group than in the non-day surgery group.

DISCUSSION

Implementation efficiency of the day surgery management model

The study found that the preoperative length of hospital stay and length of hospital stay for day surgery patients were shorter than those for non-day surgery patients. Therefore, the implementation of day surgery effectively reduced patients’ length of hospital stay. Regarding

Table 2: Comparison of baseline characteristics of patients under day surgery and non-day surgery models [n (%)]

Variable grouping	Overall	Day surgery (n = 2509)	Non-day surgery (n = 2886)	Chi-square value	P value
Sex				1.763	0.184
Male	2497 (46.28)	1137 (45.32)	1360 (47.12)		
Female	2898 (53.72)	1372 (54.68)	1526 (52.88)		
Age				2.292	0.514
≤ 18	995 (18.44)	480 (19.13)	515 (17.84)		
19–39	374 (6.93)	176 (7.01)	198 (6.86)		
40–59	1753 (32.49)	794 (31.65)	959 (33.23)		
≥ 60	2273 (42.13)	1059 (42.21)	1214 (42.07)		
Marital status				1.67	0.434
Unmarried	1095 (20.30)	493 (19.65)	602 (20.86)		
Married	4155 (77.02)	1952 (77.8)	2203 (76.33)		
Other	145 (2.69)	64 (2.55)	81 (2.81)		
Payment method				6.163	0.104
Urban employee basic medical insurance	1877 (34.79)	916 (36.51)	961 (33.3)		
Urban resident basic medical insurance	2820 (52.27)	1278 (50.94)	1542 (53.43)		
Full self-payment	451 (8.36)	202 (8.05)	249 (8.63)		
Other insurance	247 (4.58)	113 (4.5)	134 (4.64)		
Place of origin				3.166	0.367
Within the district	2895 (53.66)	1370 (54.6)	1525 (52.84)		
Within the city (outside the district)	2149(39.83)	987 (39.34)	1162 (40.26)		
Within the province (outside the city)	175 (3.24)	72 (2.87)	103 (3.57)		
Outside the province	176 (3.26)	80 (3.19)	96 (3.33)		
Disease/surgical types				0.566	0.967
Cataract removal	2420 (44.86)	1117 (44.52)	1303 (45.15)		
Tonsillectomy	965 (17.89)	450 (17.94)	515 (17.84)		
Vocal cord polyp removal	838 (15.53)	389 (15.5)	449 (15.56)		
Endoscopic colorectal polyp removal	791 (14.66)	377 (15.03)	414 (14.35)		
Hand muscle release surgery	381 (7.06)	176 (7.01)	205 (7.1)		

Table 3: Comparison of medical expenses for patients under day surgery and non-day surgery models [M (P₂₅, P₇₅), CNY]

Variable	Day surgery group	Non-day surgery group	z score	P value
Treatment costs	1945.0 (1750.0, 2088.6)	2144.1 (1944.5, 3257.6)	-21.048	< 0.001
Examination fees	894.0 (422.0, 1248.0)	1045.0 (945.0, 1395.0)	-24.794	< 0.001
Nursing fees	32.4 (24.3, 48.6)	145.8 (105.3, 204.3)	-62.209	< 0.001
Bed charges	30.0 (30.0, 60.0)	150.0 (120.0, 210.0)	-64.964	< 0.001
Medication costs	425.6 (327.8, 1031.4)	772.7 (513.8, 1593.4)	-29.538	< 0.001
Total hospital expense	6995.3 (5438.8, 8340.3)	9759.0 (8018.1, 14986.4)	-34.684	< 0.001

Table 4: Comparison of waiting time for treatment under day surgery and non-day surgery models [M (P₂₅, P₇₅), days]

Variable	Day surgery group	Non-day surgery group	z score	P value
Preoperative length of hospital stay	1 (1,1)	2 (1,3)	-48.061	< 0.001
Length of hospital stay	1 (1,2)	5 (4,7)	-64.964	< 0.001

Table 5: Postoperative effectiveness in patients with digestive polyps in the day surgery and non-day surgery models

Variable grouping	Day surgery (n = 208)	Non-day surgery (n = 209)	X ² value	P value
Bleeding status			0.000 ^a	1
Not occurred	207 (99.52)	207 (99.04)		
Occurred	1 (0.48)	2 (0.96)		
Unplanned reoperation			—	—
Not occurred	208 (100.00)	209 (100.00)		
Occurred	0 (0)	0 (0)		
Postoperative infection			—	—
Not occurred	208 (100.00)	209 (100.00)		
Occurred	0 (0)	0 (0)		
Discharge outcome			0.000 ^b	1
Improved	205 (98.56)	206 (98.56)		
Cured	2 (0.96)	2 (0.96)		
Not cured	0 (0)	0 (0)		
Other	1 (0.48)	1 (0.48)		

Note: ^aContinuous correction method was used; ^bLikelihood ratio test was used.

Table 6: Comparison of patient experience scores in the day surgery and non-day surgery models (mean ± SD, points)

Dimension	Day surgery group (n = 208)	Non-day surgery group (n = 209)	t value	P value
Convenience of service	4.13 ± 0.60	3.72 ± 0.40	8.29	< 0.001
Accessibility of service	4.20 ± 0.56	3.52 ± 0.54	12.73	< 0.001
Pain perception	4.15 ± 0.45	3.26 ± 0.43	20.71	< 0.001
Satisfaction	4.16 ± 0.65	3.83 ± 0.44	6.07	< 0.001

medical expenses, the hospital expenses of day-surgery patients were lower than those of non-day-surgery patients.^[8] Therefore, the promotion of day surgery can effectively reduce the medical expenses for treatment, examination, nursing, bed, and medication for inpatients. One reason for this is that with the reduction in the length of hospital stay, the costs of related medical services naturally decrease. Another reason is the targeted reimbursement policy for day surgery by China’s national medical insurance, which reduces patients’ out-of-pocket medical expenses. Therefore, the implementation of day surgery alleviates the financial burden of medical expenses on patients’ families and saves expenditure from the national medical social security fund, allowing more medical resources to be invested where they are most needed, thereby improving the efficiency of medical resource utilization.

Implementation effectiveness of the day surgery management model

Regarding the surgical effect of day surgery, combined with the analysis results from reviewing case data and questionnaire surveys, no difference was observed between day surgery and non-day surgery concerning discharge outcomes and postoperative wound bleeding.

The occurrence of unplanned reoperations and the number of postoperative infections were zero, suggesting no difference in surgical effectiveness between day and non-day surgery. This may be because day surgery screens the surgical grade and difficulty of recovery when admitting disease/surgical types, only allowing technically mature and moderately difficult disease/surgical types to be included in the day surgery management category. However, in day surgery management centers, physicians with a senior professional title or above, who can proficiently master the surgical techniques of day surgery disease/surgical types, are selected, ensuring a good grasp of the surgical treatment effect. Therefore, strict preoperative assessment, patient admission, disease/surgical type admission, and surgical physician qualification admission are particularly important for the medical quality and safety assurance of day surgery.

Regarding patients’ medical experience, day surgery patients experience better advantages than non-day surgery patients. Thus, implementing day surgery can effectively enhance patients’ experience in the convenience of service, accessibility of service, pain relief, and satisfaction. In addition, patients’ medical

experience was found to be related to their age, type of medical insurance, type of visit, and place of origin. However, the questionnaire surveys and in-depth personal interviews emphasized certain problems in the management process of day surgery. To further leverage the role of the day surgery management model in the operational efficiency and service effectiveness of medical services, attention should be paid to the entire process of inpatient diagnosis and treatment,^[9,10] and targeted optimization of inpatient procedures and related policy interventions should be provided based on patients' characteristics.

As a convenient and effective management model, day surgery can improve the efficiency of medical resource allocation and the refinement of hospital management, assisting hospitals in providing better high-quality, and efficient medical and health services. It mitigates the current medical problems of "high medical fees and difficulty in securing access to medical services", meets individuals' demands for a good medical experience, and to some extent, plays an important driving role in the development of civilized society and the advancement of the "Healthy China" initiative. Therefore, it is a commendable new hospital management model.

However, there are also certain problems and constraints in the operation and management process of day surgery, including service processes, doctor/patient communication, policy support,^[11] supporting facilities, incentive supervision mechanisms, and extended services outside the hospital.^[12] To further enhance the service effectiveness of the day surgery management model, targeted day surgery management and improvement strategies should be implemented from the perspectives of patients, hospital administrators, physicians, and nursing staff. Continuous optimization of the inpatient management process during the perioperative period of day surgery should be promoted, the linkage process of medical insurance should be advanced, the allocation of medical facilities and equipment should be improved^[13], and efforts should be made to enhance the understanding and recognition of day surgery among patients. Additionally, effective supervision and incentive measures should be established to improve the medical experience of patients with different characteristics in all dimensions and stimulate the new efficiency of hospital medical services.

DECLARATIONS

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Conflicts of interest

There is no conflict of interest among the authors.

Data sharing statement

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