Safety and Efficacy of Day-Case Versus Inpatient Endoscopic Sinus Surgery for Chronic Rhinosinusitis: A Retrospective Cohort Study

Ann. Ital. Chir., 2026 97, 3: 580–587
https://doi.org/10.62713/aic.4383

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AIM: This study aimed to evaluate the safety, clinical efficacy, and economic benefits of day-case endoscopic sinus surgery (ESS) for chronic rhinosinusitis (CRS) in a Chinese population, and to compare these indicators between the day-surgery and traditional inpatient models.

METHODS: This retrospective cohort study enrolled 80 CRS patients who underwent ESS. Patients were divided into a day-case group (n = 36) and an inpatient group (n = 44). Furthermore, perioperative indicators, hospitalization costs, follow-up costs, subjective symptoms (visual analogue scale [VAS] scores), and objective endoscopic findings (Lund-Kennedy scores) were assessed between the two groups over four weeks post-discharge period.

RESULTS: The day-surgery group demonstrated significantly shorter preoperative waiting times (2.97 $\pm$ 0.96 hours vs 18.03 $\pm$ 4.47 hours, $p < 0.001$) and hospital stays (0.52 $\pm$ 0.18 days vs 3.64 $\pm$ 0.90 days, $p < 0.001$) compared with the inpatient group. Similarly, hospitalization costs were also lower in the day-case group (11,861.56 $\pm$ 3024.71 Yuan vs 29,061.75 $\pm$ 4603.45 Yuan, $p < 0.001$, 1 USD = 7.2 CNY). There were no significant differences in surgical duration, Wong-Baker Faces Pain Score, follow-up costs, or the rate of postoperative adverse events between the two groups. Both groups showed significant and comparable improvements in VAS and Lund-Kennedy scores from baseline through four weeks post-discharge.

CONCLUSIONS: Day-case endoscopic sinus surgery is comparable to inpatient surgery in terms of short-term safety and clinical improvement, while significantly shortening hospital stay and reducing hospitalization costs. However, given that this study is a retrospective study and may have selection bias, the above results should still be interpreted with caution.

Keywords: day-case surgery; endoscopic sinus surgery; chronic rhinosinusitis; feasibility; safety

Introduction

Chronic rhinosinusitis (CRS) is a globally prevalent, persistent inflammatory condition of the nasal cavity and paranasal sinuses, with epidemiological study estimating a prevalence of approximately 5% to 12% among adults in Europe and the United States [1]. Typical symptoms include nasal obstruction, rhinorrhea, facial pain or pressure, and olfactory impairment. Collectively, these manifestations can significantly reduce quality of life by impairing daily activities, sleep quality, and work performance [2]. Initial CRS management is generally medical and relies on intranasal corticosteroids and saline irrigation. However, when symptoms persist despite adequate therapeutic intervention, endoscopic sinus surgery (ESS) becomes the primary management option [3]. This minimally invasive technique is designed to restore sinus ventilation and drainage, thereby improving clinical outcomes [4].

Submitted: 30 September 2025 Revised: 6 December 2025 Accepted: 18 December 2025 Published: 10 March 2026
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Editor: Roberto Cirocchi

In recent years, day-surgery has advanced rapidly and is now widely adopted worldwide as an alternative model of healthcare delivery [5,6]. During this management model, patients complete preoperative investigations and assessments before admission, undergo the planned procedure on the scheduled day, and are discharged within 24 hours. The day-surgery model can shorten hospital stays, accelerate bed turnover, and enhance the efficiency of healthcare resource utilization [7].

As ESS approaches have become more optimized and anesthesia techniques have continued to advance, applying a day-surgery model for ESS in CRS has become increasingly feasible [8–10]. However, comprehensive evidence on its safety, clinical efficacy, and economic benefits in the Chinese population remains limited. Although the traditional inpatient approach is well established, it generally involves longer hospital stays and relatively higher overall costs, thereby increasing the financial and logistical burden on patients [11].

Therefore, this retrospective study compares the perioperative indicators, clinical outcomes, and economic costs between the day-surgery and traditional inpatient models in patients with CRS undergoing the same ESS procedure. The study further emphasizes differences in perioperative management models rather than surgical technique. The

purpose is to comprehensively evaluate the safety and feasibility of the day-surgery model for treating CRS, to inform clinical practice and offer new insights into more efficient use of healthcare resources and reduced financial burden for patients.

Methods

Recruitment of the Study Participants

This retrospective study initially enrolled 84 patients with CRS who underwent ESS in Yueqing People's Hospital between September 2024 and March 2025. Four patients were excluded because of lost follow-up, leaving a final cohort of 80 patients. All procedures were performed by three senior ear, nose, and throat (ENT) surgeons.

Patient assignments to the day-surgery or traditional inpatient group were not randomized; instead, they were determined through a comprehensive clinical assessment. The primary determinants included patient willingness or preferences, disease status, and social factors. Generally, patients were considered suitable for the day-surgery pathway if they had an American Society for Anesthesiologists (ASA) classification of I or II, were clinically stable, had lower anesthetic risk, and had adequate social support (for example, a caregiver at home and residence in close proximity to the hospital). The final decision was made jointly by the attending surgeon and the patient after evaluating these factors.

This study received approval from Ethics Committee of Yueqing People's Hospital (Approval No. YQYY202400191) and was conducted in accordance with the principles of the Declaration of Helsinki [12]. All patients provided written informed consent.

Inclusion and Exclusion Criteria

Inclusion criteria for patient selection were as follows: (1) a diagnosis of CRS, including both CRS with nasal polyps (CRSwNP) and CRS without nasal polyps (CRSsNP), confirmed by paranasal sinus computed tomography (CT) and consistent with the "Chinese Guidelines for Diagnosis and Treatment of Chronic Rhinosinusitis (2018)" [13]; (2) patients with indications for ESS and received surgical treatment; (3) age $\geq$18 years; (4) capable to independently complete the required questionnaire surveys; (5) provision of informed consent with voluntary participation.

Patients were excluded in they had (1) a history of allergy to non-steroidal anti-inflammatory drugs (NSAIDs); (2) severe cardiac, pulmonary, hepatic, or renal dysfunction; (3) uncontrolled chronic diseases, such as hypertension, diabetes, or asthma; (4) alcohol addiction or substance abuse; (5) coagulation abnormalities or a history of gastrointestinal bleeding or peptic ulcer diseases; and (6) poor compliance or inability to attend scheduled follow-up.

Surgical Procedure

Before surgery, patients designated for day-surgery protocol completed comprehensive preoperative assessments in the outpatient settings, including routine laboratory evaluations, imaging examinations, electrocardiography, and pulmonary function testing. Patients were directed to fast for six hours before surgery. Prophylactic antibiotics were administered intravenously 30 minutes before the procedure. ESS was performed under intravenous general anesthesia with oral endotracheal intubation. A standardized anesthesia protocol was applied to all patients, and anesthesia was typically induced with propofol in combination with fentanyl or remifentanil, and maintained with infusions of propofol and remifentanil, along with a neuromuscular blocker such as rocuronium. The ESS procedure is meant to excise sinus lesions and establish drainage by opening the involved sinuses.

Postoperatively, patients received a single intravenous dose of antibiotics and were monitored for 4–6 hours. They were discharged from the hospital if no surgical complications were observed during the monitoring period. For procedures concluded late in the day, discharge was typically scheduled for the following morning. If significant surgical complications occurred before discharge, monitoring was extended, or the patients were shifted to inpatient management as appropriate. After discharge, patients were advised to visit the ENT outpatient clinic or seek emergency care promptly if any significant postoperative complications developed.

In the traditional inpatient group, preoperative examinations were conducted on the day of admission or the following day, using the same assessment items as those applied in the day-surgery protocol. Surgery was generally scheduled for the second or third day of admission. Preoperative preparation, perioperative medications, anesthesia management, and the surgical procedures were consistent with those used in the day-surgery group.

Patients received prophylactic intravenous antibiotics for 24 to 48 hours after surgery. Patients were discharged on the second day of surgery if no postoperative surgical complications developed. However, hospitalization was prolonged when postoperative complications occurred. All patients received a telephone follow-up 3 days after discharge, and outpatient visits were scheduled at 1, 2, and 4 weeks post-discharge.

Outcome Measures

Surgical outcomes were assessed by measuring perioperative, economic, and procedural efficacy indicators, as detailed below.

Perioperative Indicators

Perioperative outcomes included surgical duration, preoperative waiting time, length of hospital stay, postoperative adverse events, and pain intensity. Surgical duration was defined as the interval from the start to the completion of the surgical procedure. Preoperative waiting time was defined as the time from hospital admission to the start of surgery.

Table 1. Comparison of baseline characteristics between the inpatient and day-surgery groups.

Variable	Total (n = 80)	Inpatient (n = 44)	Day-surgery (n = 36)	Statistic	*p*-value
Age (years)	46.49 ± 16.08	44.41 ± 16.03	49.03 ± 16.01	$t = -1.28$	0.203[a]
Gender, n (%)				$\chi^2 = 0.37$	0.543[b]
Male	43 (53.75)	25 (56.82)	18 (50.00)		
Female	37 (46.25)	19 (43.18)	18 (50.00)		
Presence of nasal polyps, n (%)				$\chi^2 = 1.02$	0.314[b]
Yes	15 (18.75)	10 (22.73)	5 (13.89)		
No	65 (81.25)	34 (77.27)	31 (86.11)		
History of nasal surgery, n (%)				$\chi^2 = 2.42$	0.119[b]
Yes	20 (25.00)	14 (31.82)	6 (16.67)		
No	60 (75.00)	30 (68.18)	30 (83.33)		
Asthma, n (%)				$\chi^2 = 0.27$	0.604[b]
Yes	20 (25.00)	10 (22.73)	10 (27.78)		
No	60 (75.00)	34 (77.27)	26 (72.22)		
Hypertension, n (%)				$\chi^2 = 0.01$	0.922[b]
Yes	24 (30.00)	13 (29.55)	11 (30.56)		
No	56 (70.00)	31 (70.45)	25 (69.44)		
Diabetes, n (%)				$\chi^2 = 0.46$	0.497[b]
Yes	10 (12.50)	7 (15.91)	3 (8.33)		
No	70 (87.50)	37 (84.09)	33 (91.67)		
Surgical method, n (%)				$\chi^2 = 2.35$	0.799[b]
Bilateral total ethmoidectomy + maxillary antrostomy + frontal sinusotomy + sphenoid sinusotomy	14 (17.50)	9 (20.45)	5 (13.89)		
Bilateral total ethmoidectomy + maxillary antrostomy + frontal sinusotomy	15 (18.75)	8 (18.18)	7 (19.44)		
Bilateral total ethmoidectomy + maxillary antrostomy	12 (15.00)	6 (13.64)	6 (16.67)		
Bilateral anterior ethmoidectomy + maxillary antrostomy	8 (10.00)	4 (9.09)	4 (11.11)		
Bilateral nasal polypectomy + total ethmoidectomy + maxillary antrostomy	15 (18.75)	10 (22.73)	5 (13.89)		
Septoplasty + bilateral total ethmoidectomy + maxillary antrostomy	16 (20.00)	7 (15.91)	9 (25.00)		

[a] *t*-test, [b] Chi-square test.

Length of hospital stay refers to the total duration from admission to discharge.

Any adverse events occurring between the end of surgery and discharge were recorded, including fever, bleeding, headache, and nasal adhesions. Postoperative pain was assessed using the Wong-Baker Faces Pain Rating Scale [14]. Pain assessment should be performed according to standard clinical nursing procedures at the first postoperative assessment point when the patient is eligible: day-surgery patients should be assessed before discharge, and inpatients should be assessed on postoperative day 1. These assessments were conducted face-to-face. Although initially developed for pediatric cohorts, the scale has been validated for adults and was selected for its intuitive design. It consists of six facial expressions, ranging from smiling to crying, corresponding to scores of 0, 2, 4, 6, 8, and 10, facilitating consistent pain reporting. A score of 0 indicates no pain, while 10 represents the worst pain imaginable.

Economic Indicators

Economic outcomes included the total hospitalization costs and outpatient follow-up expenses.

Efficacy Indicators

Efficacy indicators were evaluated using the visual analogue scale (VAS) and Lund-Kennedy scores at the baseline (preoperatively) and at 1, 2 and 4 weeks post-discharge. The visual analogue scale was used to quantify the overall CRC-related symptom severity. This comprehensive scale assesses patient-reported, global measures that capture the combined severity of symptoms, including nasal obstruction, rhinorrhea, and facial pressure. Overall symptom severity was categorized as mild (0–3 points), moderate (>3–7 points), and severe (>7–10 points). A VAS score of above 5 indicated clinically meaningful impairment in quality of life [13].

Objective outcomes were evaluated using the Lund-Kennedy nasal endoscopy scoring system [13,15]. This scoring method evaluates five endoscopic features on each side of the nasal cavity, including polyps, edema, discharge,

Table 2. Comparison of perioperative indicators between the two groups.

Variable	Total (n = 80)	Inpatient (n = 44)	Day-surgery (n = 36)	Mean difference (95% CI)	Statistic	*p*-value
Surgical time (minutes)	86.12 ± 18.23	85.66 ± 18.50	86.69 ± 18.15	–1.03 (–9.34, 7.28)	t = –0.25	0.802[a]
Preoperative wait time (hours)	11.13 ± 8.35	18.03 ± 4.47	2.97 ± 0.96	15.06 (13.01, 17.11)	t = 21.75	<0.001[a]
Length of hospital stays (days)	2.24 ± 1.71	3.64 ± 0.90	0.52 ± 0.18	3.12 (2.78, 3.46)	t = 22.46	<0.001[a]
Pain score (Wong-Baker)	6 (3.00, 8.00)	6 (2.00, 7.25)	6 (3.00, 8.00)	-	Z = –0.67	0.502[b]
Adverse reactions, n (%)					-	0.781[c]
No	63 (78.75)	34 (77.27)	29 (80.56)			
Fever	3 (3.75)	2 (4.55)	1 (2.78)			
Bleeding	6 (7.50)	3 (6.82)	3 (8.33)			
Headache	3 (3.75)	1 (2.27)	2 (5.56)			
Nasal adhesions	5 (6.25)	4 (9.09)	1 (2.78)			

[a] t-test, [b] Mann-Whitney test, [c] Fisher exact.

scarring, and crusting. Each indicator is scored from 0 to 2, where 0 represents absence, 1 indicates mild involvement, and 2 denotes severe involvement. Total scores range from 0 to 10 per side, yielding a total bilateral score of 0 to 20.

Statistical Analysis

Statistical analysis was performed using SPSS version 24.0 (IBM Corp., Armonk, NY, USA). The Shapiro-Wilk test was used to assess the normality of distribution for continuous variables. Normally distributed continuous variables were presented as mean ± standard deviation (SD), and comparisons between the two groups were made using the independent samples t-test. Non-normally distributed variables were expressed as median (first quartile, third quartile) and compared using the Mann-Whitney U test.

Categorical variables were presented as counts and percentages (n, %) and compared using the Chi-square test or Fisher's exact test, as appropriate. Repeated-measures analysis of variance (ANOVA) was used to assess the therapeutic efficacy between the two groups over time, with Bonferroni correction applied for post hoc multiple comparisons. A p-value of less than 0.05 was considered statistically significant.

Results

Comparison of Baseline Characteristics Between the Two Groups

This study enrolled 80 patients, with 44 (55.0%) assigned to the inpatient group and 36 (45.0%) to the day-surgery group. The mean age of the study cohort was 46.49 ± 16.08 years, including 43 males (53.75%) and 37 females (46.25%). No statistically significant differences were observed in age, sex, presence of nasal polyps, history of nasal surgery, asthma, hypertension, diabetes, or the surgical method between the two groups. Comparison of baseline characteristics between the inpatient and day-surgery groups is presented in Table 1.

Comparison of Perioperative Indicators Between Groups

There were no statistically significant differences in surgical time (p = 0.802) or Wong-Baker Pain Score (p = 0.502) between the two groups. However, the inpatient group had a significantly longer preoperative wait time than the day-surgery group (18.03 ± 4.47 hours vs 2.97 ± 0.96 hours), with a mean difference of 15.06 hours (95% CI: 13.01 to 17.11 hours; $p < 0.001$). Similarly, the length of hospital stays was more extended in the inpatient group (3.64 ± 0.90 days vs 0.52 ± 0.18 days), with a mean difference of 3.12 days (95% CI: 2.78 to 3.46 days; $p < 0.001$). The incidence of postoperative adverse events showed no statistically significant difference between groups (p = 0.781, Table 2).

Comparison of Economic Indicators Between Groups

As shown in Table 3, total hospitalization costs were significantly higher in the inpatient group (29,061.75 ± 4603.45 Yuan, 1 USD = 7.2 CNY) than in the day-case group (11,861.56 ± 3024.71 Yuan), yielding a mean difference of 17,200.19 Yuan (95% CI: 14,751.52 to 19,648.86 Yuan; $p < 0.001$). Conversely, follow-up costs were comparable between the inpatient and day-surgery groups, with no statistically significant difference observed (p = 0.838).

Comparison of Efficacy Indicators Between Groups

The repeated measures ANOVA results for VAS scores in the two groups are presented in Table 4. The Mauchly's test of sphericity indicated that the sphericity hypothesis was not valid (p = 0.008). Because the Huynh-Feldt epsilon value was >0.75, Huynh-Feldt correction was applied to the within-group effects. The analysis revealed a significant main effect of time on VAS scores (F = 179.73, $p < 0.001$). Specifically, VAS scores reduced progressively from baseline to 4 weeks post-discharge, indicating a significant symptom improvement over time. Post hoc comparisons showed that VAS scores at each follow-up time point were substantially lower than the preoperative baseline. Furthermore, the VAS score at 2 weeks post-discharge was significantly lower than that at 1 week, while no significant difference was observed between 2 weeks and 4 weeks post-discharge assessments (**Supplementary Table 1**). There were no significant differences between the inpatient and day-surgery groups in terms of the main effect of group (p = 0.189) or the group-by-time interaction (p = 0.836).

Table 3. Comparison of economic indicators between the two groups.

Variable	Total (n = 80)	Inpatient (n = 44)	Day-surgery (n = 36)	Mean difference (95% CI)	Statistic	*p*-value
Hospital cost (Yuan)	21,321.65 ± 9472.99	29,061.75 ± 4603.45	11,861.56 ± 3024.71	17,200.19 (14,751.52, 19,648.86)	$t = 20.05$	<0.001[a]
Follow-up cost (Yuan)	2501.55 ± 701.82	2486.93 ± 705.68	2519.42 ± 706.64	–32.49 (–364.55, 299.57)	$t = –0.20$	0.838[a]

[a] *t*-test. Costs are reported in Chinese Yuan (CNY) and reflect the 2024–2025 period. Costs are expressed in USD, 1 USD = 7.2 CNY.

Table 4. Comparison of VAS scores between the two groups.

Variable	Groups	
	Inpatient (n = 44)	Day-surgery (n = 36)
VAS score		
Baseline	3.81 ± 0.92	4.07 ± 0.98
1 week post-discharge	2.52 ± 0.90	2.53 ± 0.98
2 weeks post-discharge	1.28 ± 0.77	1.37 ± 0.82
4 weeks post-discharge	1.13 ± 0.81	1.29 ± 0.57
F time, *p* time	179.73, <0.001	
F group, *p* group	1.75, 0.189	
F interaction, *p* interaction	0.29, 0.836	

VAS, visual analogue scale.

Table 5. Comparison of Lund-Kennedy scores between the two groups.

Variable	Groups	
	Inpatient (n = 44)	Day-surgery (n = 36)
Lund-Kennedy score		
Baseline	14.43 ± 2.75	14.86 ± 3.03
1 week post-discharge	12.00 ± 2.66	11.89 ± 3.01
2 weeks post-discharge	12.25 ± 1.83	12.22 ± 2.39
4 weeks post-discharge	7.80 ± 3.15	8.61 ± 2.31
F time, *p* time	74.06, <0.001	
F group, *p* group	1.04, 0.310	
F interaction, *p* interaction	0.49, 0.693	

Table 5 presents the repeated measures ANOVA measures for Lund-Kennedy scores between the two groups. Mauchly's test revealed that the assumption of sphericity was satisfied ($p = 0.852$); therefore, uncorrected repeated measures ANOVA results are directly reported. A significant main effect of time was observed on Lund-Kennedy scores ($F = 74.06$, $p < 0.001$). Specifically, Lund-Kennedy scores decreased progressively from baseline to 4 weeks post-discharge, indicating a significant improvement over time. Post hoc analysis demonstrated that scores at all post-discharge follow-up time points were significantly lower than the preoperative baseline. Moreover, the 4-week score was substantially lower than scores in 1 and 2 weeks, whereas no significant difference was observed between the scores at 1 and 2 weeks' assessments (**Supplementary Table 2**). Furthermore, there were no significant differences in the main effect of group ($p = 0.310$) or the group-by-time interaction ($p = 0.693$) between groups.

Although the repeated-measures ANOVA did not show a significant main effect of group, we further compared between-group mean differences at each time point. For VAS scores, the mean differences (95% CI) were –0.26 (–0.78 to 0.26) at baseline, –0.01 (–0.57 to 0.55) at 1 week, –0.01 (–0.64 to 0.62) at 2 weeks, and –0.16 (–0.54 to 0.22) at 4 weeks post-discharge. For Lund-Kennedy scores, the corresponding mean differences (95% CI) were –0.43 (–2.02 to 1.16) at baseline, 0.11 (–1.42 to 1.64) at 1 week, 0.03 (–1.18 to 1.24) at 2 weeks, and –0.81 (–2.48 to 0.86) at 4 weeks post-discharge. The confidence intervals crossed zero at all time points, consistent with the ANOVA results and supporting comparable efficacy between the inpatient and day-surgery groups.

Discussion

CRS significantly affects the patient's quality of life, and ESS remains the primary treatment option for individuals unresponsive to medical therapy [16]. The day-case surgery model is prioritized for its potential to enhance healthcare efficiency and improve healthcare resource utilization [17]. However, widespread implementation of day-surgery ESS, particularly in healthcare settings such as China, requires more evidence regarding its safety, clinical efficacy, and economic benefits. In our study, among appropriately selected patients, day-surgery ESS significantly improved perioperative efficiency and reduced healthcare costs while providing short-term outcomes comparable to those of the conventional inpatient approach, thereby confirming its feasibility.

The success of day-case surgery is not accidental but relies on a systematic support framework. First, pathway standardization is essential. Consistency in preoperative assessment, anesthesia management, surgical techniques, and discharge criteria helps maintain both efficiency and safety throughout the perioperative duration. Second, professional teamwork and effective multidisciplinary collaboration are crucial. A dedicated day-surgery team involving surgeons, anesthesiologists, nurses, and administrative staff enables timely communication and coordinated care, which directly supports patient safety. Finally, technological advances play a crucial role in day-surgery success. Modern anesthesia has reduced postoperative symptoms such as nausea, and minimally invasive ESS techniques promote faster recovery with less pain, making discharge achievable within 24 hours for suitable patients.

Our findings are closely consistent with several previous studies. For instance, a large-scale UK study and a report from New Zealand revealed that the day-case ESS is safe and offers substantial cost advantages [18,19]. These findings suggest that the fundamental strengths of the day-case model are broadly applicable across diverse healthcare sys-

tems. However, significant contextual differences should be considered. In many Western settings, day-surgery is already a routine care approach, whereas in China, its expansion also serves the practical goal of alleviating pressure on hospital access and reducing financial burdens. In our cohort, day-case surgery reduced hospitalization costs by nearly 60%, which is particularly significant for self-paying patients or those with limited insurance coverage. Therefore, our study provides locally valuable evidence to optimize care pathways in China and may be informative for other developing countries experiencing limited healthcare resources.

Our results demonstrate significant differences in perioperative efficiency between the two management pathways. Compared with the inpatient group, patients in the day-case group had significantly shorter preoperative waiting times and substantially reduced hospital stays. Specifically, the mean hospitalization time in the day-case group was 0.52 days, contrasting sharply with 3.64 days in the inpatient group. These findings align with previous studies reporting that day-case surgery can enhance overall service efficiency [18,20]. Importantly, there was no significant difference in surgical duration or Wong-Baker Pain Score between the two groups, indicating that the accelerated process did not affect the surgical procedure and achieved pain control comparable to the traditional inpatient care [21].

From an economic perspective, day-case ESS proved to be a more favorable option. The total hospitalization costs in the day-surgery group were significantly lower than those in the inpatient group, indicating a substantial reduction in financial burden for both patients and the healthcare systems [19]. The cost-effectiveness of day-case surgery and its ability to conserve resources have been well documented [22], and our study further substantiates this evidence for ESS for CRS. In practical terms, the additional 2–3 days of hospitalization in the traditional inpatient model generate substantial costs related to bed occupancy, routine nursing care, potentially unnecessary antibiotic use, and other indirect hospital expenses. The day-case surgery effectively reduces these expenditures by completing preoperative assessments in the outpatient setting and adhering to strict postoperative discharge criteria. Notably, there was no difference in follow-up costs between the two groups, indicating that the savings occur primarily during hospitalization and are not merely shifted to the postoperative recovery phase [23].

A core concern is whether improving efficiency reduces the quality of care [24]. Our study suggests it does not. Regarding clinical efficacy, patients in both groups achieved significant and comparable improvements in symptom severity and endoscopic findings within four weeks after surgery [15,21]. These findings demonstrate that the day-case pathway can achieve clinical benefits comparable to those of the traditional inpatient model, while maintaining a similarly high standard of postoperative recovery and short-term outcomes [18,19].

Safety is the primary concern for implementing day-case ESS. Our study revealed no significant difference in the incidence of postoperative adverse events between the two groups, including fever, bleeding, headache, and nasal adhesions. This similarity supports the safety profile of day-case ESS and is consistent with previous findings [18,21]. Although postoperative bleeding was included within the adverse event-outcomes and found no between-group difference, the overall low event rate further supports the safety profile.

Furthermore, surgical extent and procedural complexity are critical determinants of suitability for early discharge. For example, complex frontal sinus procedures may require precise reconstruction approaches, such as mucosal flaps or stent placement, to reduce the risk of stenosis and maintain long-term patency. These cases can demand more intensive postoperative monitoring and may be less appropriate for a day-case pathway. Therefore, a crucial underlying condition of our findings is careful case selection, with less complex procedures being prioritized when adopting a streamlined day-surgery model [25]. Equally important is rigorous patient selection that accounts for baseline health status and social support [26,27]. Comprehensive preoperative evaluation, clear communication about potential minor postoperative complications, and adequate analgesia planning are essential to ensure patient satisfaction and safe early discharge. Additionally, a well-structured, dedicated day-surgery team is also crucial for maintaining coordination and reducing perioperative risk [24].

However, these results should be interpreted with appropriate caution. The most significant limitation of this study is the substantial risk of selection bias due to its non-randomized, retrospective design. Group allocation was based on patient preference and clinical assessment rather than random assignment. Consequently, patients managed in the day-surgery pathway may have possessed unmeasured baseline advantages, such as stronger social support, greater health literacy, or stronger motivation and capacity for postoperative self-management. These factors could independently promote recovery and reduce complications, thereby potentially exaggerating the apparent benefits due to the day-case model.

Although our baseline comparison showed no significant differences between the two groups in major clinical characteristics, residual confounding cannot be excluded. Therefore, our findings should not be interpreted as evidence that day-surgery models are preferable for all patients with CRS. Rather, our study supports the feasibility, safety, and efficiency of the day-case model in carefully selected, low-risk subgroups. This interpretation highlights a core clinical principle: appropriate patient and procedure selection is fundamental to implementing a safe and effective day-case surgery program.

This study has several strengths, including the head-to-head comparison of two perioperative surgical models using a comprehensive set of perioperative, economic, and clini-

cal efficacy indicators. However, several limitations should be acknowledged. First, this was a retrospective, single-center study with a relatively small sample size. Second, we did not retrospectively collect or compare data on preoperative hormone use, which could act as a potential confounding variable. Third, the follow-up period was limited to four weeks. While sufficient for evaluating early safety and short-term efficacy, this timeframe is inadequate to assess long-term CRS prognosis, such as polyp recurrence and sustained symptom control. Thus, larger, prospective, multi-center studies with extended follow-up are warranted to validate these findings and explore broader applicability. Finally, a limitation relates to the timing of pain assessment. Because clinical pathways differed, pain was assessed before discharge on the day of surgery in the day-case group, whereas inpatients were typically evaluated on postoperative day 1. Given the time-dependent nature of postoperative pain, this temporal discrepancy in assessment timing may have introduced bias when comparing pain scores between groups.

Conclusions

In conclusion, our retrospective cohort study indicates that, in appropriately selected patients, a day-surgery model for ESS offers safety and short-term clinical efficacy comparable to the traditional inpatient model, while providing significant economic advantages. Day-case ESS effectively reduces hospital stays and decreases costs without compromising patient outcomes or increasing postoperative adverse events. These findings provide valuable evidence supporting the broader implementation of day-case ESS, particularly in optimizing healthcare resource utilization and reducing the financial burden of patients.

Availability of Data and Materials

The data analyzed are available from the corresponding author upon reasonable request.

Author Contributions

QH conceptualized and designed the study, carried out the research, analyzed the data and drafted the manuscript. MK contributed to study design, methodology development, statistical analysis and manuscript revision. LJ was primarily responsible for conceiving and designing the study and provided professional clinical guidance for the interpretation of clinical data throughout the entire research process. All authors have been involved in revising the manuscript critically for important intellectual content. All authors gave final approval of the version to be published. All authors have participated sufficiently in the work to take public responsibility for appropriate portions of the content and agreed to be accountable for all aspects of the work in ensuring that questions related to its accuracy or integrity.

Ethics Approval and Consent to Participate

This study received approval from Ethics Committee of Yueqing People's Hospital (Approval No. YQYY202400191), and was conducted in accordance with the guiding principles of the Declaration of Helsinki. All patients provided written informed consent.

Acknowledgment

Not applicable.

Funding

This project is funded by the Wenzhou Municipal Medical and Health Science Research Program (2024035).

Conflict of Interest

The authors declare no conflict of interest.

Supplementary Material

Supplementary material associated with this article can be found, in the online version, at https://doi.org/10.62713/aic.4383.

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