



Economic evaluation of stapokibart for chronic rhinosinusitis with nasal polyps in China: a cost–effectiveness analysis

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Aim: To evaluate the cost–effectiveness of stapokibart compared with dupilumab in treating chronic rhinosinusitis with nasal polyps (CRSwNP) from the healthcare system perspective in China. The focus is on assessing the economic viability of biologic treatments in managing CRSwNP, particularly when conventional treatments and/or surgery fail to provide sufficient relief. **Materials & methods:** A decision tree Markov model was developed to assess the cost–effectiveness of stapokibart and dupilumab. Clinical data from multiple trials were used, and a matching-adjusted indirect comparison was conducted to account for differences in patient populations across studies. Sensitivity analysis was performed to evaluate the robustness of the model results under varying assumptions. **Results:** The study results indicate that stapokibart offers a clear economic advantage over dupilumab. It both lowers treatment costs and enhances patients' quality of life. Sensitivity analysis shows that stapokibart remains cost-effective at the threshold of one to three-times China's per capita GDP, demonstrating strong economic viability in the Chinese healthcare context. **Conclusion:** The study demonstrates that stapokibart is a cost-effective treatment option for CRSwNP compared with dupilumab. It offers significant improvements in patient outcomes and is economically viable under the prevailing healthcare budget in China, providing valuable insights for policy-makers and healthcare providers.

Plain language summary: Comparing the economic value of stapokibart & dupilumab for chronic rhinosinusitis with nasal polyps in China

What is this article about? In China, stapokibart and dupilumab are biologic treatments for chronic rhinosinusitis with nasal polyps, a long-term condition that can seriously affect how people feel and live. For some patients, standard medicines or surgery do not provide enough relief, and biologic treatments may then be considered. However, these treatments are expensive, so it is important to understand which option provides better value.

To assess the economic value of stapokibart compared with dupilumab, this study evaluated the costs and health outcomes of the two treatments from the healthcare system perspective in China. Because there was no direct clinical trial comparing stapokibart with dupilumab, data from separate clinical studies were used and adjusted to make the comparison as fair as possible.

What were the results? The results showed that stapokibart was associated with lower overall treatment costs and better health outcomes than dupilumab in the main analysis. Additional analyses also showed that the findings remained stable under different assumptions. When the price difference between the two drugs was removed, stapokibart was no longer cost-saving, but it still remained cost-effective.

What do the results mean? These findings suggest that stapokibart may offer an economic advantage over dupilumab for patients with chronic rhinosinusitis with nasal polyps in China. The results may help support treatment selection and medical insurance decision-making in clinical practice.

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Keywords: chronic rhinosinusitis • cost–effectiveness • dupilumab • nasal polyps • stapokibart



Chronic rhinosinusitis with nasal polyps (CRSwNP) is mainly characterized by T2 inflammation, with eosinophilic infiltration and elevated levels of cytokines such as IL-4, IL-5 and IL-13. This condition is further complicated by tissue remodeling and epithelial barrier dysfunction, with the presence of nasal polyps. CRSwNP often co-occurs with bronchial asthma and aspirin-exacerbated respiratory disease [1]. A cross-sectional study conducted in seven cities across China shows that the overall prevalence of chronic rhinosinusitis (CRS) is 8.0%, slightly lower than in Europe (10.9%) and the USA (12–14%). Among the general population in China, CRS is estimated to affect approximately 8.0% of individuals [2]. The estimated nationwide prevalence of CRSwNP is approximately 20–33%, which translates to 10 million to 38 million cases. CRSwNP is predominantly a disease of middle age, with a peak incidence between the fourth and fifth decades of life. CRSwNP places a significant health burden on patients and significantly impacts their quality of life. Symptoms like nasal congestion, reduced sense of smell, and headaches often seen in CRSwNP can severely affect daily activities and sleep quality [3].

Conventional treatments for CRSwNP include intranasal corticosteroids, macrolides, mucolytics, antihistamines, leukotriene receptor antagonists and biologics, with functional endoscopic sinus surgery as the primary surgical option. The emergence of biologics has offered new treatment options for CRSwNP patients, mainly for those with inadequate control by conventional treatments or surgery. Dupilumab is the first biologic approved for CRSwNP worldwide, receiving approval from the US FDA in June 2019. Omalizumab and mepolizumab were approved by the FDA in December 2020 and July 2021, respectively. In China, stapokibart, a biologic the same as dupilumab in targeting the IL-4R α receptor, was approved by the National Medical Products Administration in December 2024. It is the first biologic approved in China for the treatment of CRSwNP. However, the high cost of surgery and biologic treatments has already placed a significant economic burden on CRSwNP patients. Studies have shown that their medical costs are 30–50% higher than those of the general population, primarily due to frequent surgeries and long-term medication. In the USA, CRSwNP accounts for approximately \$5.7 billion in annual direct healthcare expenditures [4], while indirect costs of CRS exceed \$20 billion per year [5]. In a recent study in Europe, direct costs for patients with CRSwNP were \$1651 per patient/year, with indirect costs of \$6225 per patient/year, largely due to outpatient/hospital visits and productivity losses, respectively. In China, the average annual direct medical cost for these patients is \$1158, with indirect costs (productivity loss due to sick leave) averaging \$797 per year. The total economic burden of the disease represents 12.3% of the patient's family's annual income [6]. From an economic perspective, the high recurrence and long-term symptoms of CRSwNP result in productivity loss and excessive use of social resources.

Currently, research on the treatment of CRSwNP remains limited, with most economic evaluations focusing on biologic therapies and surgical procedures. Yong M *et al.* used dupilumab, omalizumab and mepolizumab as the starting points in the decision tree model in Canada. The results indicated that omalizumab was the most cost-effective treatment when compared with dupilumab and mepolizumab [7]. Yong M *et al.* compared the cost-effectiveness of dupilumab and Aspirin Desensitization for CRSwNP patients in the US. While dupilumab shows some cost-effectiveness, its high cost presents an economic challenge [8]. According to Eugenio De Corso *et al.*, dupilumab's ICUR was below the commonly accepted cost-effectiveness threshold compared with best supportive care in Italy, and sensitivity analysis confirmed the robustness and economic sustainability of the results [9]. George A *et al.* found that endoscopic sinus surgery is more economically viable than dupilumab in treating CRSwNP, as it is less costly and offers long-term treatment outcomes [10]. Although the cost-effectiveness of dupilumab, omalizumab and mepolizumab have been assessed in the context of US, Canada and Italy, a similar assessment tailored to the Chinese context remains to be conducted. To address this gap, the present study employs the decision tree Markov model, incorporating data from the CROWNS-2 (NCT06801353) [11] and SINUS-52 (NCT02898454) [12] clinical trials. This model is used to evaluate the cost-effectiveness of stapokibart, which was the first biologic approved for treating CRSwNP in China.

Materials & methods

Study design

Target population & research perspective

Stapokibart is recommended for patients with CRSwNP who have poor control with glucocorticoids and/or surgery. Based on the clinical trial population selection, this study focuses on adults with CRSwNP who have poor control with conventional treatment and/or surgery.

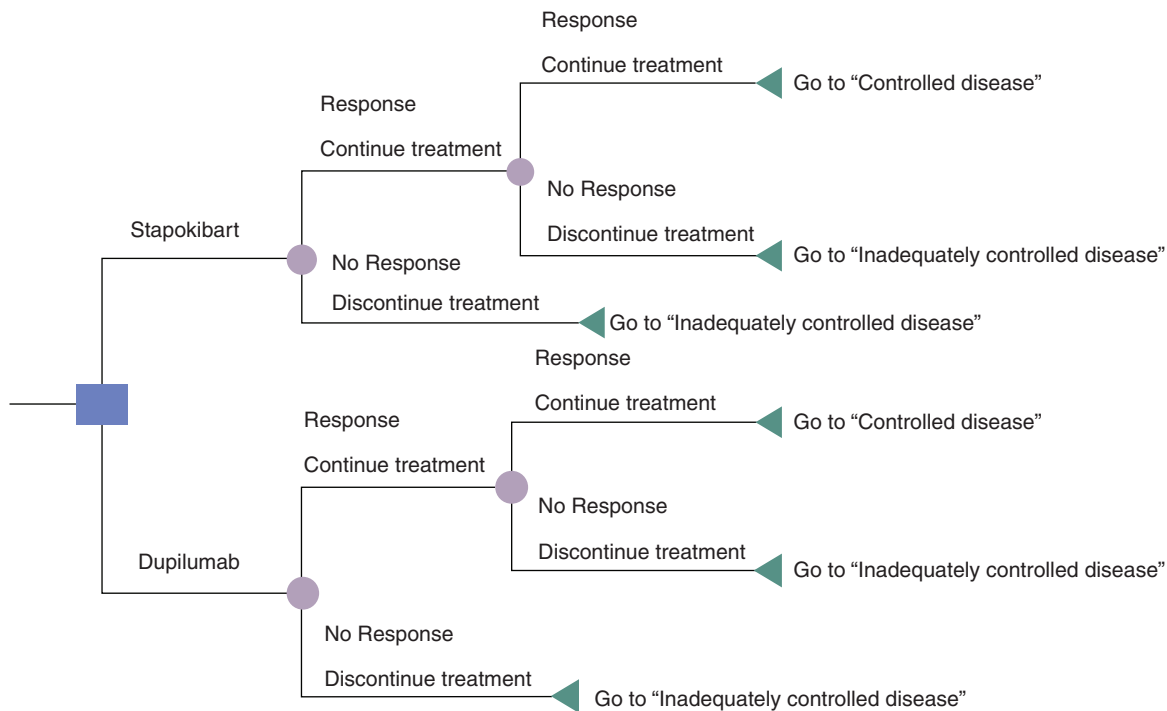


Figure 1. Decision tree model.

The study adopts the healthcare system perspective, focusing on the viewpoint of healthcare decision-makers and considering the resource consumption and patient benefits of both the intervention and control measures. Given the difficulty in calculating indirect costs and other related expenses caused by the disease, and the relatively good efficacy of this treatment, this study does not account for indirect costs.

Intervention & comparator

In this study, stapokibart is employed as the primary intervention. Given that the dosage recommendation in the package insert differs from the clinical trial protocol, and considering the study predominantly relies on the clinical trial framework, the intervention adheres to the clinical trial regimen. Specifically, stapokibart is administered at a dosage of 300 mg every 2 weeks, while mometasone furoate nasal spray (MFNS) is used at a dosage of 200 µg once daily.

Dupilumab is employed as the reference intervention. Given that it targets the same receptor as stapokibart, shares the primary indication of atopic dermatitis, and that its published Phase III clinical trials closely align with the stapokibart trial design, the control regimen follows the dosage used in those Phase III trials. Specifically, dupilumab is administered at a dosage of 300 mg every 2 weeks, while MFNS is used at a dosage of 200 µg once daily.

Model description & structure

In the decision tree model, the continuation of biologic therapy for patients treated with biologics is evaluated both at 24 and 52 weeks. Based on The Chinese expert consensus on the use of biologics in patients with chronic rhinosinusitis [13] and the study by Eugenio De Corso *et al.* [9], we established the criteria for determining whether patients achieved a response. Specifically, patients are considered to have achieved a response if the nasal polyp score (NPS) decreases by at least 1 point and the Sino-Nasal Outcome Test-22 (SNOT-22) score improves by at least 8.9 points from baseline. Otherwise, biologic treatment is discontinued (Figure 1). In accordance with the clinical trial design, product labeling, and relevant guidelines, patients in the continuous biologic treatment arm receive stapokibart 300 mg every 2 weeks in the experimental group or dupilumab 300 mg every 2 weeks in the control group. In the discontinuation arm, patients receive prednisone acetate 30 mg daily for 14 days, followed by MFNS 200 µg once daily, hereinafter referred to as standard drug therapy. After completion of the decision tree phase,

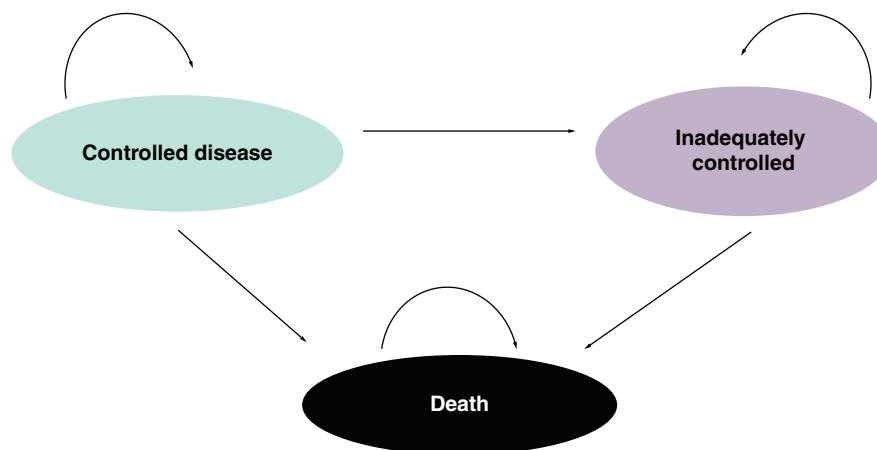


Figure 2. Markov model.

patients transition to the Markov model for long-term simulation of health state transitions and associated costs and outcomes.

After the 52-week decision tree phase, patients transition into the Markov model. In the initial state, those who discontinue biologic therapy enter the ‘Inadequately controlled’ state, whereas those who continue biologic therapy remain in the ‘Controlled disease’ state. Patients remain in the ‘Controlled disease’ state if the NPS decreases by at least 1 point and the Sino-Nasal Outcome Test-22 (SNOT-22) score improves by at least 8.9 points from baseline; otherwise, they move to the ‘Inadequately controlled’ state. It is assumed that once the disease transitions from ‘Controlled disease’ to ‘Inadequately controlled’, it does not revert to the ‘Controlled disease’ state (Figure 2).

According to The 2023 Health and Wellness Development Statistical Bulletin of China, the country’s average life expectancy is 78.9 years [14]. The average age of onset for CRSwNP is 46 years [15]. Therefore, the Markov model adopts a 33-year time horizon with a 1-year cycle length. In the ‘Controlled disease’ state, patients in the experimental arm receive stapokibart 300 mg every 2 weeks plus MFNS 200 µg once daily. According to the Chinese Expert Consensus on the Use of Biologics in Patients with Chronic Rhinosinusitis [13], when a single biologic fails to control the disease, switching to another biologic or considering surgery with standard drug therapy is recommended. Given that mepolizumab was approved by the National Medical Products Administration in 2025 for the treatment of CRSwNP, this study specifies mepolizumab as the replacement biologic. In the ‘Inadequately controlled’ state, some patients undergo surgery followed by standard drug therapy, while others switch to mepolizumab 300 mg every 4 weeks in combination with standard drug therapy.

Comparison of efficacy & safety

Due to the lack of direct clinical trial evidence comparing stapokibart with dupilumab, this study uses indirect comparison instead of direct comparison [16]. Since the control group in the CROWNS-2 trial used stapokibart instead of a placebo from 24 to 52 weeks, this study applied the anchored MAIC method for the 0–24 week period and the unanchored MAIC method for the 24–52 week period. These methods were used to align individual patient data (IPD) of the CROWNS-2 with aggregated data (AgD) from SINUS-24 and SINUS-52. Using multivariable regression, the clinical treatment guidelines and expert consensus for CRSwNP, along with the effective sample size after matching and adjustment, selected age, gender, baseline NPS and baseline SNOT-22 total score as baseline characteristics for both anchored and unanchored MAIC. In R, logistic regression was used to adjust the weights of the experimental group’s IPD data at 24 and 52 weeks of stapokibart, generating a weight histogram and the corresponding weights for each patient.

In the unanchored MAIC, the efficacy ORAB for stapokibart versus dupilumab is calculated using the following formula, where ORAC represents the efficacy of stapokibart versus placebo, and ORBC represents the efficacy of dupilumab versus placebo:

$$\text{LogOR}_{AB} = \text{Log}_{AC} - \text{Log}_{BC} \quad (\text{Equation 1})$$

Table 1. Clinical parameters for the pharmacoeconomic evaluation of stapokibart.

Variable name	Parameter description	Base value	Standard error	Distribution	Upper limit	Lower limit	Source	Ref.
Decision tree achievement rates	24-week stapokibart achievement rate	0.563	0.029	Beta	0.620	0.507	Derived through MAIC	
	24-week dupilumab achievement rate	0.520	0.027	Beta	0.572	0.468	De Corso E <i>et al.</i>	[10]
	52-week stapokibart achievement rate	0.908	0.046	Beta	0.998	0.817	Derived through MAIC	
	52-week dupilumab achievement rate	0.560	0.029	Beta	0.616	0.504	De Corso E <i>et al.</i>	[10]
Markov transition probabilities	Stapokibart disease control maintenance probability	0.908	0.046	Beta	0.998	0.817	Derived through MAIC	
	Stapokibart disease control to inadequate probability	0.091	0.005	Beta	0.100	0.082	Derived through MAIC	
	Dupilumab disease control maintenance probability	0.560	0.029	Beta	0.616	0.504	De Corso E <i>et al.</i>	[10]
	Dupilumab disease control to inadequate probability	0.439	0.022	Beta	0.483	0.395	De Corso E <i>et al.</i>	[10]
	Natural mortality rate	0.001	0.000	Beta	0.001	0.001	WHO China Natural Mortality Rate	
Probability of using other treatments in inadequate control state	Probability of surgery use in the standard treatment group	0.106	0.005	Beta	0.117	0.095	Expert consultation	
	Probability of medication use in the standard treatment group	0.894	0.046	Beta	0.983	0.805	Expert consultation	

Data were processed using R[®] version 4.3.0, with count data expressed as percentages and analyzed using the χ^2 test. Continuous data are presented as $\bar{x} \pm s$ and analyzed using the *t*-test, with $p \leq 0.05$ indicating statistical significance. In the MAIC analysis, binary variable results are expressed as odds ratios (OR).

Model input

Efficacy input

The clinical parameters used in the economic evaluation mainly consist of efficacy data. These include parameters such as achievement rate, transition probability, the probability of using alternative treatments under inadequately controlled conditions, and the incidence of adverse reactions. The achievement rate of stapokibart was derived from the IPD of CROWNS-2 after matching adjustment through a MAIC comparison with dupilumab. In the Markov model, the probability of maintaining disease control is based on the 52-week achievement rate from the decision tree model. The mortality rate is based on the natural mortality rate reported by the WHO [18]. The probability of switching biologics or undergoing surgery is derived from expert consultation. The detailed parameter values are provided in Table 1.

Based on previous literature research, clinical trial realities and data availability, this study includes only adverse events with an incidence rate of 0.05% or higher. The adverse events for stapokibart that meet the criteria include upper respiratory tract infection, pharyngitis, urinary tract infection, cough, toothache, joint pain and COVID-19. For dupilumab, the adverse events include injection site erythema, bronchitis, pharyngitis, upper respiratory tract infection, joint pain, back pain, headache, asthma, cough and nosebleeds, among others. The common adverse events for both biologics, such as upper respiratory tract infection, cough and joint pain, were included for MAIC, and the corresponding adverse event costs were calculated. Specific adverse events are listed in the Table 2.

Cost input

Based on the research perspective, this study focuses only on the direct medical costs related to treatment, including drug costs, adverse event management costs and drug administration costs. As some patients require surgery, surgery and inpatient care costs are also included. For details on the cost parameters, refer to Table 3. All the costs were presented in US dollar based on 2024 prices (USD: RMB = 1: 7.1217).

The price of stapokibart is provided by enterprises. The prices of dupilumab and mepolizumab are based on local drug pricing in China. MFNS and prednisone acetate have been marketed for many years, with many manufacturers. The median price were obtained from the Public database. Drug preparation cost, nasal polyp

Table 2. Adverse event incidence rates.

Parameter description		Base value	Standard error	Distribution	Upper limit	Lower limit	Source
Stapokibart	Upper respiratory tract infection	0.034	0.003	Beta	0.041	0.027	Derived through MAIC
	Cough	0.265	0.027	Beta	0.318	0.212	
	Joint pain	0.046	0.005	Beta	0.056	0.037	
Dupilumab	Upper respiratory tract infection	0.060	0.007	Beta	0.072	0.048	Derived through MAIC
	Cough	0.067	0.007	Beta	0.080	0.054	
	Joint pain	0.064	0.020	Beta	0.077	0.051	

Table 3. Treatment cost parameter inputs.

Parameter description	Base value	Standard error	Distribution	Upper limit	Lower limit	Source
Stapokibart (300 mg/\$)	169.622	17.308	Gamma	203.547	135.698	The current PAP-adjusted sales price
Dupilumab (300 mg/\$)	211.747	21.607	Gamma	254.097	169.398	Local price
Mepolizumab (100 mg/\$)	404.398	41.265	Gamma	485.277	323.518	
Mometasone furoate nasal spray (per use/\$)	0.513	0.052	Gamma	0.616	0.410	PharmCube Database
Prednisone acetate (per use/\$)	0.051	0.005	Gamma	0.061	0.040	
Drug preparation cost	4.774	0.487	Gamma	5.729	3.819	Healthcare price list
Nasal polyp removal surgery cost	312.451	31.883	Gamma	374.942	249.961	
Follow-up cost	221.174	22.569	Gamma	265.409	176.939	

Table 4. Adverse event management cost parameter inputs.

Parameter	Base value	Standard error	Distribution	Upper limit	Lower limit	Source	Ref.
Upper respiratory tract infection	31.193	3.183	Gamma	37.432	24.954	Gong Y <i>et al</i>	[19]
Cough	37.984	3.876	Gamma	45.581	30.387		
Joint pain	18.107	1.848	Gamma	21.729	14.486	Lin YT <i>et al.</i>	[20]

Table 5. Utility parameters.

Parameter description	Base value	Standard error	Distribution	Upper limit	Lower limit	Source
Adequately controlled utility	0.9770	0.056	Beta	1.000	0.782	CROWNS-2
Inadequately controlled utility	0.9242	0.066	Beta	1.000	0.739	CROWNS-2

removal surgery cost and follow-up cost prices are based on the healthcare price list. Follow-up costs include sinus CT, nasal endoscopy, blood routine tests, blood biochemistry (dry chemical method), urine routine tests, 12-lead ECG, PK blood sample collection, olfactory function testing and the collection of nasal secretions and exfoliated nasal cells. The frequency of use is based on CROWNS-2. Surgical costs include the cost of nasal polyp removal surgery and standard treatment. The adverse event management costs used in this study are based on literature research. The detailed values are presented in Table 4 [19,20].

Utility inputs

In the CROWNS-2, EQ-5D was used to measure the utility values of CRSwNP patients at baseline, 24 weeks, and 52 weeks. Thus, the utility value is based on the IPD of CROWNS-2, and the detailed values are presented in Table 5.

Analysis

Basic analysis

The base case analysis was run with Microsoft Office Excel, and the direct medical costs and CRSwNP health outcomes were discounted at a rate of 5.0% according to the recommendations of Guidelines for Pharmaceutical Economic Evaluation of China (2020 edition) [21]. The end points included incremental cost-effectiveness ratio (ICER), net monetary benefit (NMB). To avoid overestimating the incremental value, half-cycle corrections to

Table 6. Baseline analysis results.

	Cost	QALY	Incremental cost	Incremental QALYs	ICER	INMB
Stapokibart	\$80,923.24	15.32	-\$1103.95	0.10	Absolute economic advantage	2467.35
Dupilumab	\$82,027.20	15.22	\	\	\	

QALY: Quality-adjusted life year; ICER: Incremental cost-effectiveness ratio; INMB: Incremental net monetary benefit.

utility were performed. The economic viability is assessed by the guideline as follows: when $ICER < 1$ times the per capita GDP, the additional cost is entirely worthwhile; when $1 \text{ times the per capita GDP} < ICER < \text{three-times the per capita GDP}$, the additional cost is acceptable; and when $ICER > \text{three-times the per capita GDP}$, the additional cost is not justified [21]. Since there was no fixed willingness-to-pay (WTP) to evaluate cost–effectiveness in China, this study recommended the WTP threshold of \$13,445 and \$40,335, which was associated with the one-time and three-times GDP per capita of China in 2024 [22], to assess whether stapokibart is highly cost-effective ($ICER \leq \$13,445$) or acceptable ($ICER \leq \$40,335$) compared with dupilumab. In addition, if $NMB > 0$, the intervention is cost-effective; if $NMB < 0$, it is not cost-effective, given the specified WTP threshold.

Sensitivity analysis

To assess the robustness of the base-case results, deterministic sensitivity analysis (DSA) and probabilistic sensitivity analysis (PSA) were conducted to address the uncertainty in the model. NMB was used for DSA because it provides a continuous, single-valued measure directly linked to the WTP threshold, avoiding the instability and interpretational difficulties of ICER when incremental effects are near zero or change sign.

As for DSA, the discount rate ranged from 0 to 8%, while other parameter estimates varied within their 95% CI based on the mean estimate and standard deviation. The cost parameters fluctuate by 20%, and the transition probabilities fluctuate by 10%. DSA results were visualized using tornado diagrams, highlighting the parameters with the greatest influence on model outcomes.

As for PSA, the PSA was performed by means of a Second-order Monte Carlo simulation. A total of 10,000 iterations were conducted following the assignment of different distribution functions to the key parameters. The gamma distribution was applied for cost parameters, while the Beta distribution was applied for utility value, transition probability parameters and discount rate. Scatter plots were developed to represent uncertainty, and cost–effectiveness acceptability curves were created based on the patient's WTP \$13,445 and \$40,335 QALY [23].

Result

Basic analysis

The analysis shows that over the entire study period, the total treatment cost for the stapokibart group is \$80,923.24, with a total utility value of 15.32 QALYs; the total treatment cost for the dupilumab group is \$82,027.20, with a total utility value of 15.22 QALYs (Table 6).

In conclusion, the stapokibart group achieved 0.10 more QALYs than the dupilumab group, with a cost reduction of \$1103.95. Stapokibart not only increased utility but also reduced treatment costs, indicating an absolute cost–effectiveness advantage.

Sensitivity analysis

Deterministic sensitivity analysis

A deterministic sensitivity analysis was performed on the model parameters to assess the impact of parameter variations on result robustness, producing the tornado diagram (Figure 3). The main parameters that influenced the results of the analysis included stapokibart disease control maintenance probability and dupilumab disease control maintenance probability, the price of dupilumab, inadequately controlled utility, adequately controlled utility, the price of stapokibart, the price of mepolizumab, the price of dupilumab, with other parameters having minimal impact on the results. Transition probability and utility are key model parameters that exert the greatest influence on the number of patients in each health state. As biologics are relatively expensive, their unit price significantly impacts the results. Therefore, these factors have a larger impact on the study results. The tornado diagram shows that the model results are relatively robust.

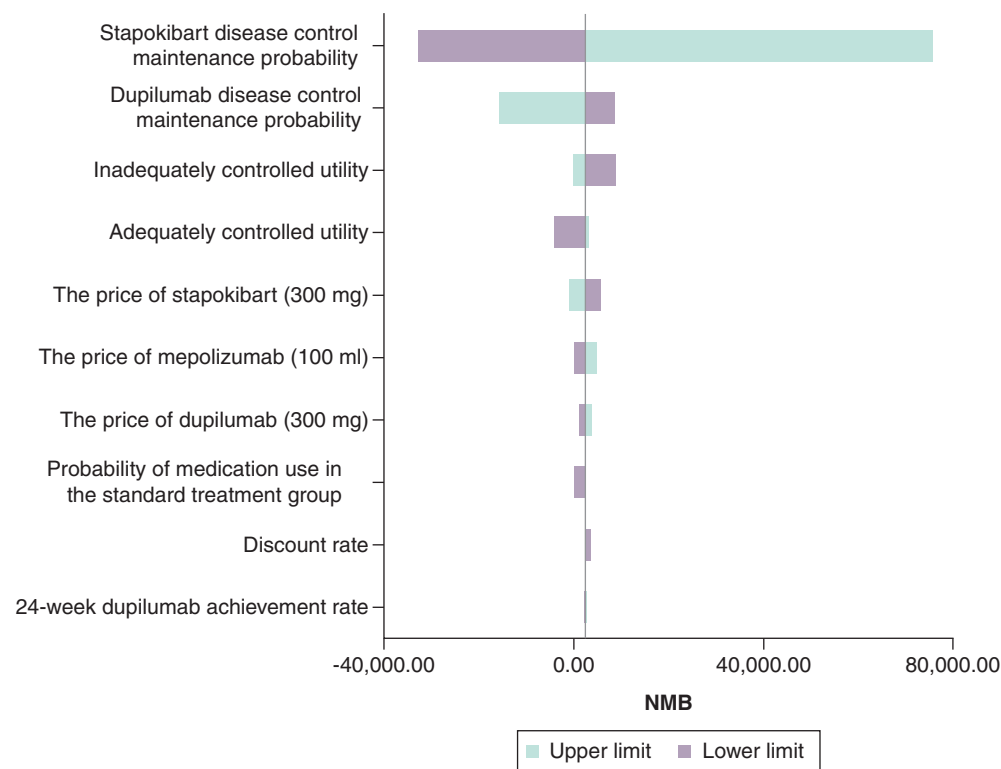


Figure 3. Results of the deterministic sensitivity analysis.
NMB: Net monetary benefit.

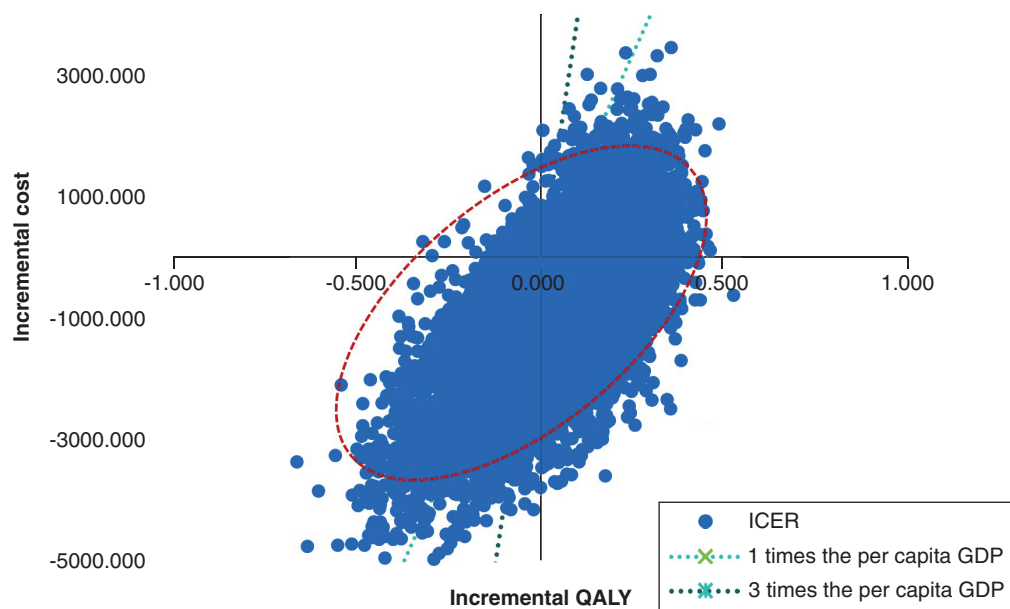


Figure 4. Monte Carlo scatter plot.
GDP: Gross domestic product; ICER: Incremental cost–effectiveness ratio; QALY: Quality-adjusted life year.

Probabilistic sensitivity analysis

In the PSA, a scatter plot (Figure 4) was generated based on 10,000 Monte Carlo simulations. Applying a conventional WTP threshold of \$13,445 per unit of gained benefit, stapokibart is cost-effective in 83.09%.

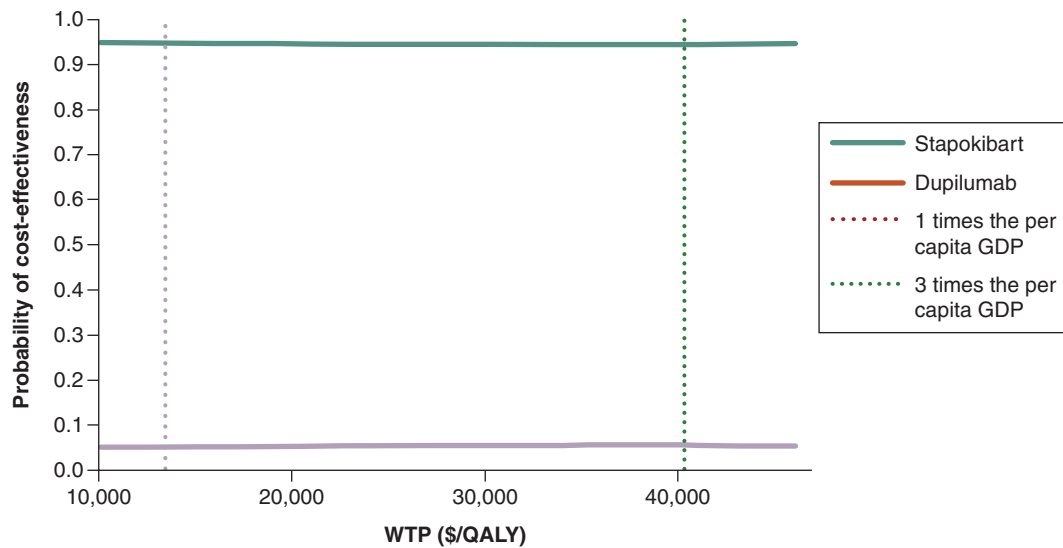


Figure 5. Cost–effectiveness acceptability curve.

GDP: Gross domestic product; QALY: Quality-adjusted life year; WTP: Willingness to pay.

Applying a conventional WTP threshold of \$40,335 per unit of gained benefit, stapokibart is cost-effective in 68.97% of the cases.

The WTP value for each QALY ranges from 0 to \$47,000, and a CEAC is generated (Figure 5). The CEAC suggests that the cost–effectiveness conclusions are robust. The CEAC indicates that the cost–effectiveness conclusions are robust. At a WTP threshold of one and three-times the per capita GDP, the curve shows that the stapokibart group has a higher probability of being cost-effective than the dupilumab group.

Scenario analysis

In the price-equalized scenario analysis, stapokibart was associated with an incremental cost of 207.22 and an incremental gain of approximately 0.101 QALYs versus dupilumab, resulting in an ICER of 2043.48 per QALY gained, which remained well below the WTP threshold of 13,445. Therefore, stapokibart was no longer dominant but remained cost-effective (Table 7).

Table 7. Scenario analysis results.

	Cost	QALY	Incremental cost	Incremental QALYs	ICER	INMB
Stapokibart	\$80,923.24	15.32	\$207.22	0.101	2043.48	1156.21
Dupilumab	\$80,716.02	15.22	\	\	\	\

QALY: Quality-adjusted life year; ICER: Incremental cost-effectiveness ratio; INMB: Incremental net monetary benefit.

Discussion

The study aims to compare the cost–effectiveness of stapokibart and dupilumab in treating CRSwNP patients unresponsive to standard treatment, from the healthcare system perspective. By constructing the decision tree Markov model, the study compares the economic viability of stapokibart and dupilumab treatment options for CRSwNP in China. The basic analysis results indicate that the stapokibart group offers a clear economic advantage over the dupilumab group. The sensitivity analysis shows that the model results are robust. At one to three-times China's per capita GDP, stapokibart is cost-effective compared with dupilumab. The price-equalized scenario analysis showed that, although stapokibart was no longer dominant, it remained cost-effective, indicating that its economic advantage was not solely attributable to price differences.

Stapokibart is a humanized IgG4 monoclonal antibody targeted against the interleukin (IL)-4 receptor alpha subunit (IL-4R α). By binding IL-4R α , stapokibart blocks the binding by (and subsequent signaling of) IL-4 and IL-13, two type 2 cytokines. stapokibart shows broad and significant efficacy in treating CRSwNP. It alleviates symptoms, improves imaging results, enhances quality of life and reduces reliance on traditional treatments. Research

indicates that frequent nasal symptoms and comorbidities cause significant social dysfunction and mental health issues, particularly increasing the risk of depression and anxiety in patients with CRSwNP. Their quality of life scores are much lower than those of the general population [24]. Treatment with stapokibart significantly improves patients' quality of life. The survey also indicates that 56.7% of patients report limitations in social activities due to symptoms, and 34.2% experience a work efficiency reduction of over 30%. Worryingly, the postoperative recurrence rate is as high as 18.3%, and the number of work absenteeism days for recurrence patients is 3.2-times that of nonrecurrence patients [25]. Treatment with stapokibart can partially replace surgery, thereby indirectly reducing social resource loss and productivity decline.

Besides CRSwNP, stapokibart is also indicated for severe atopic dermatitis (approved in China on 12 September 2024) and allergic rhinitis (approved on 17 February 2025). Using a drug across multiple indications broadens the treated population, enabling fixed costs to be spread over a larger volume and lowering the marginal cost per patient. Biologics have provided an important treatment option for patients with refractory CRSwNP who do not respond to conventional therapy or surgery. However, their high cost poses challenges in terms of long-term affordability and accessibility.

A limitation of this study is that adjustment for multiple baseline characteristics may substantially reduce the effective sample size, which in turn can compromise the statistical power to detect differences between treatment groups. Moreover, despite adjustment for available baseline characteristics, including age, sex, NPS and SNOT-22, unobserved or unreported confounding factors between the CROWNS-2 and SINUS-52 trials may still exist and could influence the estimated magnitude of stapokibart's superiority.

Conclusion

Based on data from China, the efficacy comparison shows that stapokibart has better clinical outcomes than dupilumab. This study also shows that the stapokibart group has a clear economic advantage over the dupilumab group, by improving patients' symptoms, enhancing quality of life and indirectly boosting social productivity.

Summary points

- Stapokibart and dupilumab are biologic treatments for chronic rhinosinusitis with nasal polyps (CRSwNP).
- This study assessed the cost-effectiveness of stapokibart compared with dupilumab from the healthcare system perspective in China.
- Decision tree Markov model was used to estimate long-term costs and health outcomes.
- Because no direct comparison trial was available, a matching-adjusted indirect comparison was conducted using data from separate clinical studies.
- In the base-case analysis, stapokibart was associated with lower treatment costs and higher QALYs than dupilumab.
- Sensitivity analyses showed that the base-case results were robust.
- In the price-equalized scenario analysis, stapokibart was no longer dominant but remained cost-effective.
- Stapokibart may represent an economically favorable treatment option for CRSwNP in China.

Author contributions

J Yang: methodology, validation, data curation, writing – original draft, writing – review and editing; L Ren: funding acquisition, validation, writing – review & editing; F Xie: methodology, data curation; R Shao: supervision, project administration; R Jiang: validation, supervision, project administration, writing – review and editing.

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Data sharing statement

The author confirms that all data generated or analyzed during this study are included in this published article.

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