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ORIGINAL RESEARCH

Dupilumab Among Patients with Uncontrolled Severe Asthma in China: A Cost-Utility Analysis

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Purpose: Dupilumab's recent approval in China as an add-on therapy for asthma provides a novel therapeutic alternative for severe asthma management, but its economic benefits remain unsubstantiated in China. This study aimed to adopt a cost-utility analysis to evaluate the economics of dupilumab in the treatment of uncontrolled severe asthma and provide an evidence-based reference for clinical decision-making and therapeutic regimen selection.

Methods: From the healthcare perspective, a Markov model was developed to simulate costs and quality-adjusted life years (QALYs) over a five-year time horizon for uncontrolled severe asthma patients aged ≥12 years receiving either dupilumab add-on therapy or standard-of-care (SoC) therapy alone. The incremental cost-utility ratio (ICUR) served as the primary outcome and was compared with the willingness-to-pay (WTP) threshold based on per capita gross domestic product (GDP) of China ($13,444.68/QALY) to determine the economics of therapeutic alternatives. The robustness of the results was verified using sensitivity analysis, and the impact of the dupilumab price on outcomes was evaluated using scenario analysis.

Results: Compared with SoC therapy, dupilumab add-on therapy incurred higher costs but provided greater utility gains, with an ICUR of $83,941.87 per QALY gained, which exceeded the WTP threshold. One-way sensitivity analysis identified the utility of controlled asthma as the predominant influential factor, followed by the price of dupilumab. Probabilistic sensitivity analysis showed that 98.8% of simulations were consistent with the base-case results, and SoC therapy had a higher probability of cost-utility acceptability than dupilumab add-on therapy. Scenario analysis revealed that reducing dupilumab's price to $70.38 would render its ICUR below the WTP threshold.

Conclusion: Based on the current Chinese healthcare system, it was not cost-utility to apply dupilumab as an add-on therapy for patients aged ≥12 years with uncontrolled severe asthma. A substantial price reduction of dupilumab could improve affordability in this patient population.

Keywords: dupilumab, biologics, severe asthma, pharmacoeconomics, cost-utility analysis

Introduction

Asthma is a chronic inflammatory respiratory disorder characterized by reversible airway obstruction. Of which, severe asthma in China guidelines is defined in patients who still uncontrolled despite good adherence with regular treatment with standard of care (SoC) (ie, combination of medium-to-high dose inhaled corticosteroids [ICS] and a second controller medication), or who worsens following therapy de-escalation, which mainly manifests as suboptimal clinical control with recurrent exacerbations, carrying substantial future risk and profoundly impairing quality of life.[1] Previous epidemiological surveys revealed an asthma prevalence of 1.24% among individuals ≥14 years in China, with severe asthma accounting for 7.1%, among whom 67.5% remain inadequately controlled.[2–4] Although severe asthma constitutes a minority of asthma patients, its treatment expenditures exceed 50% of the average costs for the general asthma population, imposing substantial economic burdens on both household finances and societal healthcare systems.[4]

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With the advancing research of asthma pathogenesis, the development of biologics targeting the type 2 inflammatory pathways has provided new therapeutic approaches for uncontrolled severe asthma. The biologic add-on therapy to SoC regimens has been recommended for patients with uncontrolled severe asthma in the Chinese Asthma guidelines and the Global Initiative for Asthma (GINA) guidelines.[1,5] Dupilumab, a monoclonal antibody inhibiting interleukin (IL)-4 and IL-13 signal, initially approved for atopic dermatitis, has demonstrated expanded therapeutic utility. Recent clinical trials have demonstrated that dupilumab significantly reduces exacerbation risk, improves lung function parameters, and enhances the quality of life of asthmatic patients compared with SoC alone.[6,7] These evidence-based benefits support its regulatory approval in November 2023 as a maintenance therapy for asthma patients aged ≥12 years in China.

Given the high price of dupilumab in China, concerns persist regarding its potential to exacerbate asthma treatment expenditure. Relevant cost-effectiveness analyses have been conducted in some countries such as Colombia,[8] Spain,[9] and Japan[10] under their respective socioeconomic and healthcare backgrounds; however, China currently still lacks corresponding pharmacoeconomic evaluations. Amid mounting pressure on medical insurance funds and the imperative for the rational allocation of finite healthcare resources, there is an urgent need for economic evidence grounded in the Chinese healthcare context to inform clinical decisions. Therefore, this study conducted a cost-utility analysis from a healthcare perspective to compare the economic value of dupilumab add-on therapy versus SoC therapy alone in uncontrolled severe asthma management, aiming to generate evidence-based guidance for therapeutic strategy optimization.

Materials and Methods

Model Overview

From the healthcare perspective, a Markov model was developed to simulate the progression of patients with uncontrolled severe asthma and to estimate the cost-utility of dupilumab plus SoC compared with SoC alone (Figure 1). The target population in this analysis was adolescent and adult patients aged ≥12 years with a diagnosis of uncontrolled severe asthma, which was consistent with the eligibility criteria of enrolled patients in the QUEST trial (NCT02414854).[6] The dosage regimen for dupilumab was subcutaneous injections of 200 mg (initial dose, 400 mg) or 300 mg (initial dose, 600 mg) every 2 weeks, and SoC consisted of medium-to-high dose ICS with a second controller medication (such as long-acting β_2 agonist [LABA], long-acting muscarinic antagonist [LAMA], leukotriene receptor antagonist [LTRA], or methylxanthines).

Based on previous studies, expert opinion, and Chinese guidelines,[1,5,8,11,12] the Markov model consisted of six mutually exclusive health states in this analysis, including "uncontrolled asthma", "controlled asthma", "mild-to-moderate exacerbation", "severe exacerbation", "asthma-related death", and "other-cause death". The "uncontrolled asthma" state and "controlled asthma" state were respectively defined as a score of ≥1.5 and <1.5 on the Asthma Control Questionnaire 5-item version (ACQ-5).[13] The "mild-to-moderate exacerbation" state was deemed to be worsening symptoms of asthma requiring additional use of rescue bronchodilators but not severe enough to warrant oral corticosteroids (OCS), or emergency department (ED) visit, or hospital admission, whereas the "severe exacerbation" state referred to a deterioration leading to (i) OCS burst (ie, treatment with OCS for ≥3 days), (ii) ED visit, or (iii) hospitalization. All modeled patients receiving dupilumab plus SoC or SoC alone were initiated in the uncontrolled asthma state, and transitioned to different states in each cycle according to the control level until the end of the time horizon or death. The "asthma-related death" only occurred in the states of exacerbation, while the "other-cause death" was assigned to all living health states in the model.

The time horizon in this model was set as five years with a cycle length of two weeks to avoid uncertainty from the large time span and ensure a more approximate price behavior in real scenarios. A half-cycle correction with an annual discount rate of 5% was applied to both the costs and benefits.[14]

This pharmacoeconomic analysis was reported in accordance with the Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) statement (Supplementary Table 1).

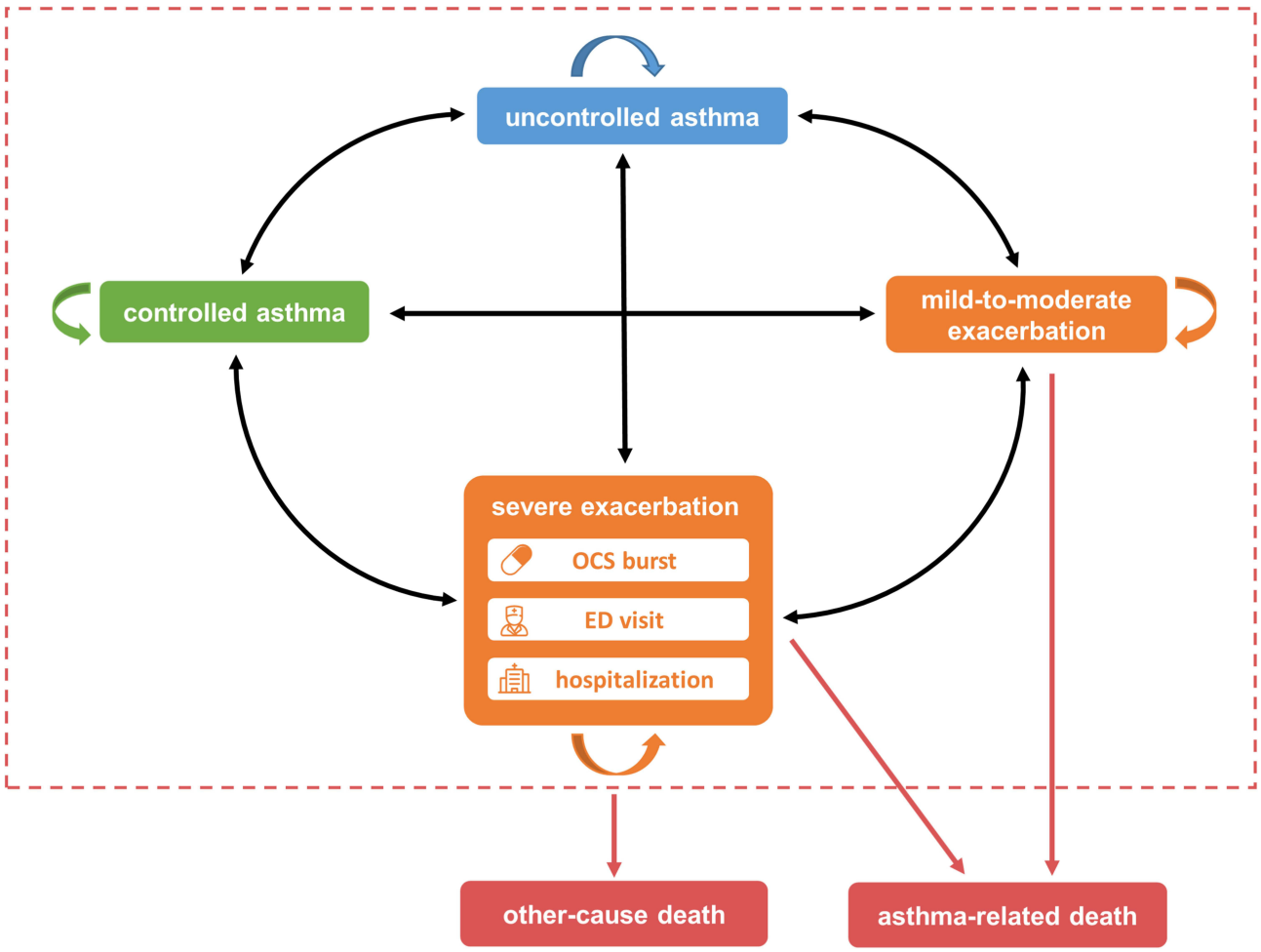

Figure 1 Markov model.
Notes: "uncontrolled asthma" is defined as a score of ≥1.5 on the Asthma Control Questionnaire 5-item version (ACQ-5). "controlled asthma" is defined as a score of <1.5 on the ACQ-5. "mild-to-moderate exacerbation" is deemed to be worsening symptoms of asthma requiring additional use of rescue bronchodilators but not severe enough to warrant oral corticosteroids (OCS), or emergency department (ED) visit, or hospital admission. "severe exacerbation" refers to deterioration leading to (i) OCS burst, that is, treatment with OCS for ≥3 days, (ii) ED visit, or (iii) hospitalization. "asthma-related death" and "other-cause death" are deemed to the end of the cycle. All modeled patients receiving dupilumab plus standard of care (SoC) or SoC alone were initiated in the uncontrolled state and transitioned to different states in each cycle according to the control level until the end of the time horizon or death.

Clinical Parameters

Due to the lack of clinical data on Chinese patients, the transition probabilities between disease-related health states were adopted from the previous post-hoc analysis of the QUEST trial on similar Asian populations, which consisted of 74 Korean patients with a mean age of 51.9 years.[11,15] In accordance with the follow-up period of the QUEST trial, the transition probabilities in the post-hoc analysis were divided into 0–12 weeks, 12–52 weeks, and post 52 weeks probabilities to reflect the variation of therapeutic effect over time in different strategies (Supplementary Table 2).

The outcomes of the two subcategories of severe exacerbation events, ED visit and hospitalization, were combined reporting in the QUEST trial,[6] thus we assumed the mean of the pooled values as the proportion of these two subcategories and inputted them into the model. The proportion of OCS burst was calculated by subtracting the number of ED visit and hospitalization from the totality of severe exacerbation events (Table 1). As the risk of adverse events was similar between the dupilumab plus SoC and SoC alone groups, the effects of adverse events were not factored into the current analysis.

For patients with severe exacerbation requiring hospitalization, the asthma-related mortality was 0.25% (95% confidence interval [CI]: 0.19–0.31) based on a nationwide survey, which was higher than general patients due to the more serious deterioration and the increasing risk of complications during hospitalization.[16] The asthma-related

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Table 1 Model Parameters

Parameters	Baseline [a]	Rang (Low-High) [b]	Distribution [c]	Reference
Clinical and epidemiological probability				
Transition probabilities between disease-related states	Detailed in Supplementary Table 2		β	[11]
Distributions of severe exacerbation				
Dupilumab plus SoC				
OCS burst	0.9288	0.9023–0.9491	β	[6]
ED visit	0.0356	0.0254–0.0488	β	[6]
Hospitalization	0.0356	0.0254–0.0488	β	[6]
Soc alone				
OCS burst	0.9296	0.9025–0.9491	β	[6]
ED visit	0.0352	0.0254–0.0487	β	[6]
Hospitalization	0.0352	0.0254–0.0487	β	[6]
Asthma-related mortality of hospitalization due to severe exacerbation	0.0025	0.0019–0.0031	β	[16]
Asthma-related mortality due to other exacerbations	0.000018	0.000014–0.000023	β	[17]
Other-cause related mortality	0.007742	0.006194–0.009290*	β	[18]
Cost ($)				
Dupilumab per 2 weeks	390.47	286.27–390.47	γ	[19]
SoC alone per 2 weeks	16.77	5.38–63.11	γ	[19]
Diagnosis on first visit	91.48	66.42–132.76	γ	[20–25]
Follow-up visits per 2 weeks				
Dupilumab plus SoC	5.67	3.53–8.88	γ	[20–25]
Soc alone	3.94	2.44–6.54	γ	[20–25]
Treatments for exacerbation per event				
Mild-to-moderate exacerbation	4.20	0.22–16.66	γ	[20–25]
Severe exacerbation requiring OCS burst	30.59	17.17–85.20	γ	[20–25]
Severe exacerbation requiring ED visit	82.47	51.75–202.25	γ	[20–25]
Severe exacerbation requiring hospitalization	539.68	343.69–1136.01	γ	[20–25]
Utility				
Controlled asthma	0.88	0.81–0.96	β	[26]
Uncontrolled asthma	0.72	0.67–0.77	β	[26]
Mild-to-moderate exacerbation	0.595	0.535–0.655	β	[11]
Severe exacerbation				
OCS burst	0.559	0.496–0.625	β	[11]
ED visit	0.556	0.380–0.732	β	[11]
Hospitalization	0.534	0.359–0.709	β	[11]
Death	0	/	/	/
Discount rate	0.05	0.03–0.08	β	[14]

Notes: [a]The base values of each parameter that were applied in base-case analysis; [b]In one-way deterministic sensitivity analysis, the parameters were varied using 95% CIs or SE based on the data sources; [c]In probabilistic sensitivity analysis, each parameter estimate was sampled from its distribution. *The source for the parameter values did not report the standard deviation or confidence interval; therefore, it was assumed that the range was equivalent to ± 20% of the baseline.
Abbreviations: SoC, standard of care; OCS, oral corticosteroids; ED, emergency department.

mortalities of other exacerbations were derived from a burden study in China.[17] The annual rates of other-cause deaths in all living health states were calculated by excluding the asthma-related deaths from the all-cause deaths that were adopted from the statistical yearbook of China (Table 1).

Cost

We performed this analysis from the perspective of Chinese healthcare providers, and the direct medical costs were only taken into account, including the expenditures on diagnosis, follow-up visits, pharmacotherapy, and treatments for exacerbation (Table 1). Drug prices were obtained from the median of the bid-winning prices in 2024 within the Yaozhi Database,[19] with the range defined by the highest and lowest bid-winning prices. For drugs under the national volume-based procurement (VBP) program, the median better reflects the clustered pricing characteristics of the bulk purchasing policies. Other direct medical costs, excluding medication expenses, were derived from the average costs of government-published healthcare service items in 2024 across six provinces (including Beijing, Guangdong, Sichuan, Shaanxi, Jiangsu, and Hubei, that distributed in the northern, southern, western, northwestern, eastern, and middle part of China),[20–25] with the range determined by the highest and lowest costs observed in these regions. Additionally, costs associated with the management of therapy-related adverse events were excluded from the cost-utility analysis due to the similar risks between the two groups, also as previous evidence showed that such costs account for <1% of the total treatment expenditures for asthma management.[27,28] The Chinese Yuan was exchanged for US dollars based on the average exchange rate for 2024 (US$1 = CNY 7.1217).

Utility

Utility weights were assigned to all health states in the model (Table 1). However, no Chinese-specific utility data related to asthma health states were identified through literature review. The utilities for "controlled asthma" and "uncontrolled asthma" states were obtained from a systematic review of quality-adjusted life years (QALYs) based on the EuroQol five-dimensional-five-level version (EQ-5D-5L) for asthma patients.[26] The disutilities associated with exacerbations were derived from the QUEST trial,[6] and the utilities in exacerbation related states were calculated by subtracting an event-specific decrement from the utility value of the "controlled asthma" state.

Model Assumptions

The assumptions were made as follows:

(i) The medication compliance of patients receiving both strategies was assumed to be 100%;

(ii) The mortality rates were constant in each cycle;

(iii) Patients experiencing severe exacerbations requiring hospitalization were assumed not to require intensive care unit (ICU) admission.

Cost-Utility Analysis

A cost-utility analysis was performed using TreeAge Pro 2022 (TreeAge Software, LLC, Williamstown, MA, USA), and the incremental cost-utility ratio (ICUR) was adopted to evaluate the economics of the two strategies, which was calculated by dividing the incremental cost by the additional QALYs gained and then compared with the willingness-to-pay (WTP) threshold, defined as the per capita gross domestic product (GDP) of China in 2024 per QALY gained ($13,444.68/QALY).

Sensitivity Analysis

One-way deterministic sensitivity analysis (DSA) and probabilistic sensitivity analysis (PSA) were conducted to assess the impact of the uncertainty surrounding the model inputs and the robustness of the base-case. In DSA, each variable was varied individually within the value range to explore the potential drivers affecting the optimal strategy, and illustrated with a tornado diagram. PSA was run with a second-order Monte Carlo simulation of 1000 iterations, in which multiple variables were sampled to vary concurrently using the corresponding distribution. The beta distribution was assigned to the transition probabilities, distributions of severe exacerbation, mortalities, utilities, and discount rate. The gamma distribution was applied to medical costs. The results of PSA were presented in the Incremental cost-utility scatter plot and cost-utility acceptability curve.

Scenario Analysis

In the scenario analysis, various price reductions of dupilumab were assumed and used to evaluate how price changes in dupilumab relative to the base-case affect the ICUR.

Results

Base-Case Analysis

As the base-case results are shown in Table 2, dupilumab plus SoC was more effective than SoC alone (3.71 QALYs vs 3.22 QALYs, respectively), but was more expensive ($44,558.08 vs $3530.91, respectively). Dupilumab plus SoC had incremental costs of $41,027.17 and incremental QALYs of 0.49 compared to SoC alone over a 5-year time-horizon for patients with uncontrolled severe asthma, resulting in an ICUR of $83,941.87 per QALY gained, which was higher than the WTP threshold.

Sensitivity Analysis

Deterministic Sensitivity Analysis

The tornado diagram indicated that the first three variables with the greatest impact on the base-case results were, in that order, the utility of controlled asthma, cost of dupilumab, and utility of OCS burst. The ICUR of the above parameters varied within their uncertainty ranges were all higher than the WTP threshold, and aligned with the base-case analysis, suggesting that the model results were robust to changes in these inputs (Figure 2).

Probabilistic Sensitivity Analysis

The PSA produced a mean ICUR of $90,542.08 per QALY gained, which was similar to the result of the base-case analysis. As shown in the scatterplot and the acceptability curve (Figure 3A and B), dupilumab plus SoC resulted in more costs and more QALYs compared with SoC alone in 98.8% of simulations, and had a nearly zero probability of being considered cost-utility at the WTP threshold below $40,334/QALY (ie, three times of per capita GDP), indicating that the base-case results were robust.

Scenario Analysis

As the result of scenario analysis shown, the ICUR fell below the WTP threshold and dupilumab became a cost-utility strategy when the price of dupilumab dropped below $70.38 in China (Figure 4).

Discussion

Severe asthma, as a chronic respiratory disorder, imposes substantial detrimental impacts on patients' quality of life and creates significant economic burdens on the healthcare system. Although dupilumab has received regulatory approval in China for asthma treatment in adolescent and adult patients aged ≥12 years, offering a novel therapeutic alternative for this severe population, its cost-utility remains to be thoroughly evaluated given the relatively elevated market price. This study was the first economic evaluation from a Chinese healthcare perspective, developing a Markov model to compare the cost-utility of dupilumab plus SoC versus SoC alone in the management of uncontrolled severe asthma. Over a 5-year time horizon, the analysis showed that while dupilumab add-on therapy provided more QALYs, it concurrently incurred higher costs. The ICUR value exceeding the WTP threshold indicated that dupilumab add-on therapy was not a cost-utility strategy compared with SoC therapy alone in patients with uncontrolled severe asthma in the current conditions in China.

Table 2 The Results of Base-Case Analysis Comparing Dupilumab Plus SoC to Soc Alone

Strategy	Cost ($)	Incr Cost ($)	QALYs	Incr QALYs	ICUR ($/QALY)
Dupilumab plus SoC	44558.08	41,027.17	3.71	0.49	83,941.87 (undominated)
Soc alone	3530.91		3.22		

Abbreviations: SoC, standard of care; QALYs, quality-adjusted life years; ICUR, incremental cost-utility ratio.

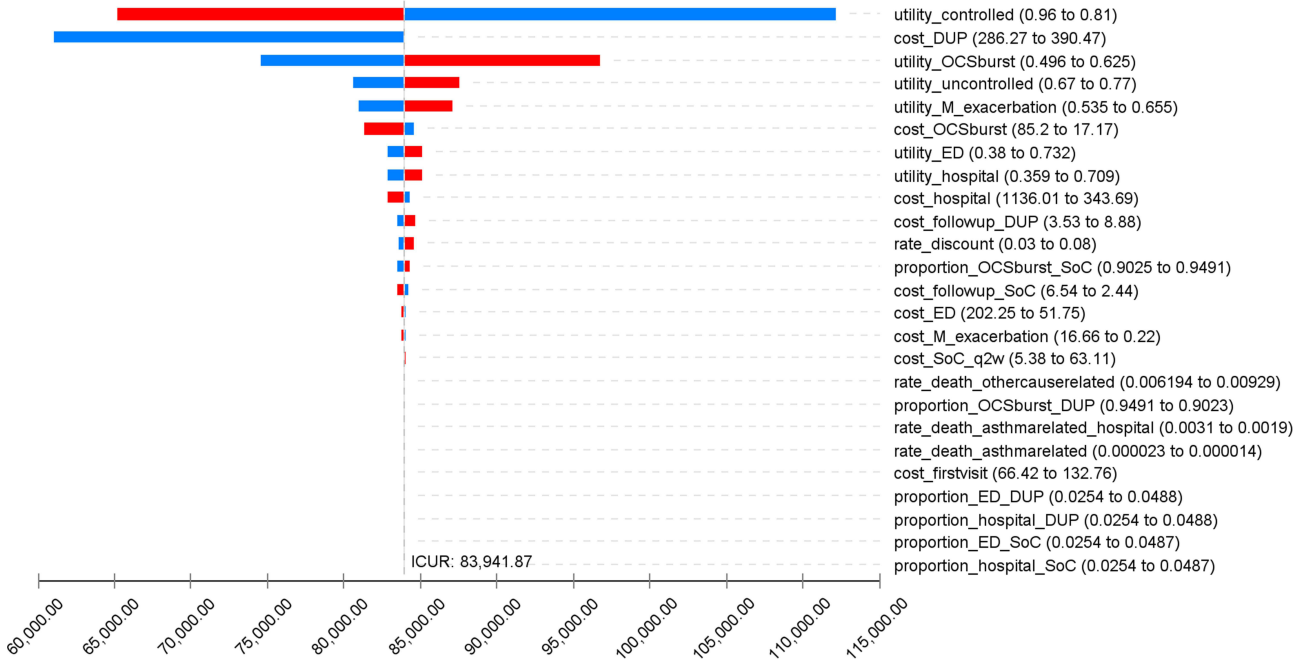

Figure 2 Tornado diagram of ICUR.

Notes: The horizontal axis represents the incremental cost-utility ratio (ICUR) values. The parameters are ordered based on the magnitude of their ICUR variation intervals.

Abbreviations: utility_controlled, utility of controlled asthma; cost_DUP, cost of dupilumab; utility_OCSburst, utility of oral corticosteroids (OCS) burst of severe exacerbation; utility_uncontrolled, utility of uncontrolled asthma; utility_M_exacerbation, utility of mild-to-moderate exacerbation; cost_OCSburst, cost of OCS burst of severe exacerbation; utility_ED, utility of emergency department (ED) visit of severe exacerbation; utility_hospital, utility of hospitalization of severe exacerbation; cost_hospital, cost of hospitalization of severe exacerbation; cost_followup_DUP, cost of follow-up of dupilumab add-on therapy; rate_discount, discount rate; proportion_OCSburst_SoC, proportion of OCS burst of severe exacerbation in the group of standard of care (SoC) therapy; cost_followup_SoC, cost of follow-up of SoC therapy; cost_ED, cost of ED visit of severe exacerbation; cost_M_exacerbation, cost of mild-to-moderate exacerbation; cost_SoC_q2w, cost of SoC therapy for every 2 weeks; rate_death_othercauserelated, rate of other-cause related death; proportion_OCSburst_DUP, proportion of OCS burst of severe exacerbation in the group of dupilumab add-on therapy; rate_death_asthmarelated_hospital, rate of asthma-related death in severe exacerbation requiring hospitalization; rate_death_asthmarelated, rate of asthma-related death in other exacerbation; cost_firstvisit, cost of first visit; proportion_ED_DUP, proportion of ED visit of severe exacerbation in the group of dupilumab add-on therapy; proportion_ hospital_DUP, proportion of hospitalization of severe exacerbation in the group of dupilumab add-on therapy; proportion_ED_SoC, proportion of ED visit of severe exacerbation in the group of SoC therapy; proportion_ hospital_SoC, proportion of hospitalization of severe exacerbation in the group of SoC therapy.

It was noteworthy that the newly updated Chinese guidelines differed significantly from the GINA guidelines in their definition of severe asthma. The distinction lied specifically in the required treatment step for uncontrolled asthma: the Chinese guidelines used medium-to-high-dose ICS-LABA as the reference treatment level, while GINA required high-dose ICS-LABA.[1,5] As the Adelphi study[29] revealed, among Chinese adults with asthma receiving GINA Step 4 or 5 treatment, only 20.9% were prescribed high-dose ICS daily. Another study[30] also demonstrated that increasing the ICS dose from medium to high did not result in significant improvement in lung function or reduction in future exacerbation risk. In addition, dupilumab was approved in China for the specific indication of asthma patients characterized by increased eosinophils or elevated fractional exhaled nitric oxide (FeNO), who remain inadequately controlled despite medium- to high-dose ICS in combination with other controller medications. Thus, the patients included in the QUEST trial were aligned well with actual clinical practice in China, and the clinical benefits of dupilumab observed in the QUEST trial remained relevant and applicable.

Our sensitivity analyses identified that the utility of controlled asthma was the primary determinant of model outcomes, suggesting that the economics of therapeutic strategies critically hinge on their capacity to restore the quality of life of patients with chronic disease to levels comparable to those of healthy individuals. Furthermore, the price of dupilumab emerged as a pivotal driver of cost-utility as well. Scenario analysis revealed that the dupilumab add-on therapy could achieve affordable when its price was reduced to $70.38. However, about 82% price reduction represents a substantial economic concession that appears unlikely to be feasible in the short term. This economic challenge may be

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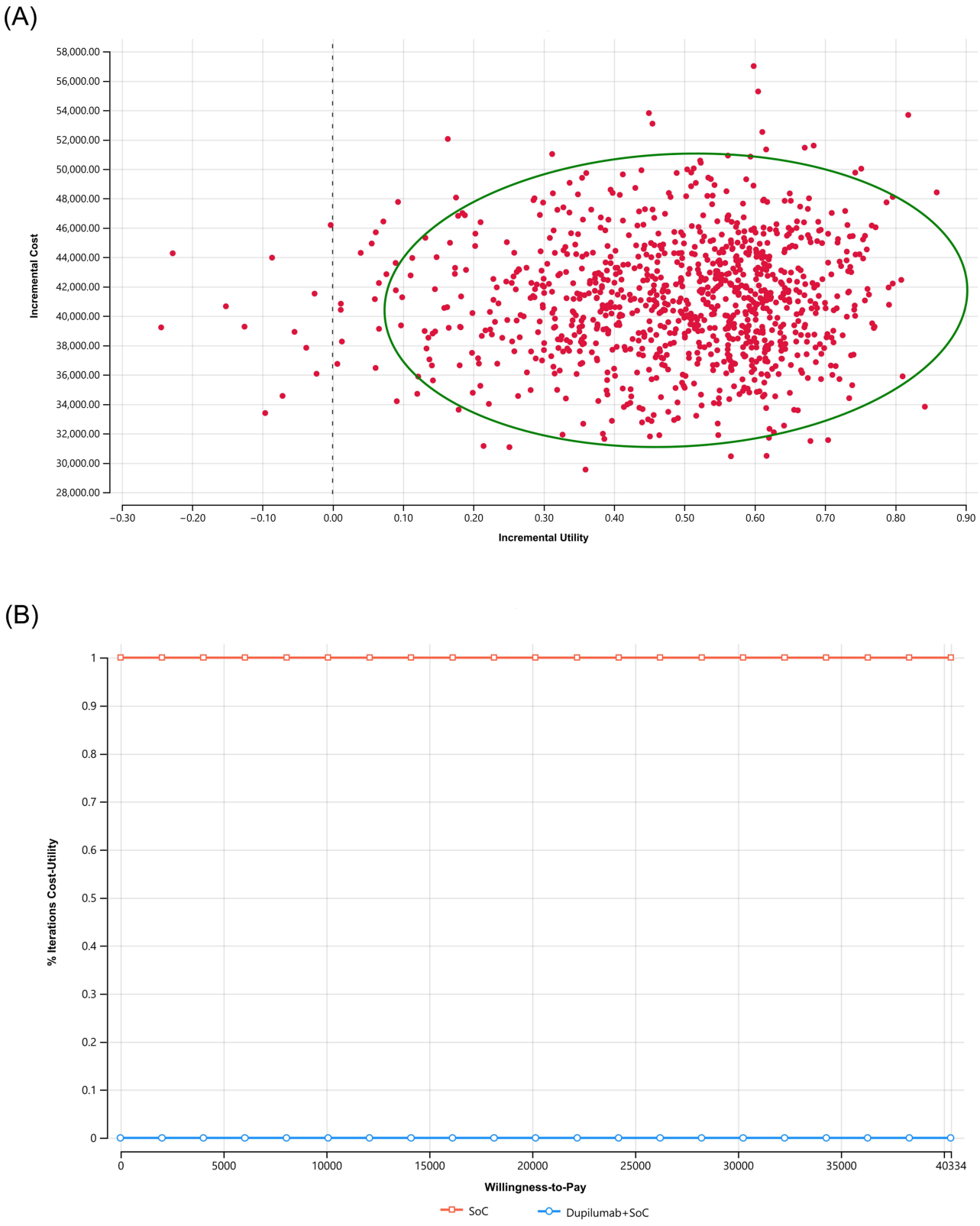

Figure 3 Probabilistic sensitivity analysis of ICUR.

Notes: (**A**) **Incremental cost-utility scatter plot.** The red scatter points represent the random outcomes of 1000 Monte Carlo simulations, with 98.8% of the points located in the first quadrant, indicating that dupilumab plus SoC is more effective but also more expensive compared to SoC alone. The green ellipse represents the 95% confidence interval of the simulated incremental cost-utility ratio (ICUR) result, meaning there is a 95% probability that the true value of the data lies within the ellipse; (**B**) **cost-utility acceptability curve.** Under the given willingness-to-pay threshold (horizontal axis), each strategy had a certain probability of being cost-utility (vertical axis). The sum of these probabilities across all compared options is equal to 1, and $40,334 corresponds to three times of per capita GDP.

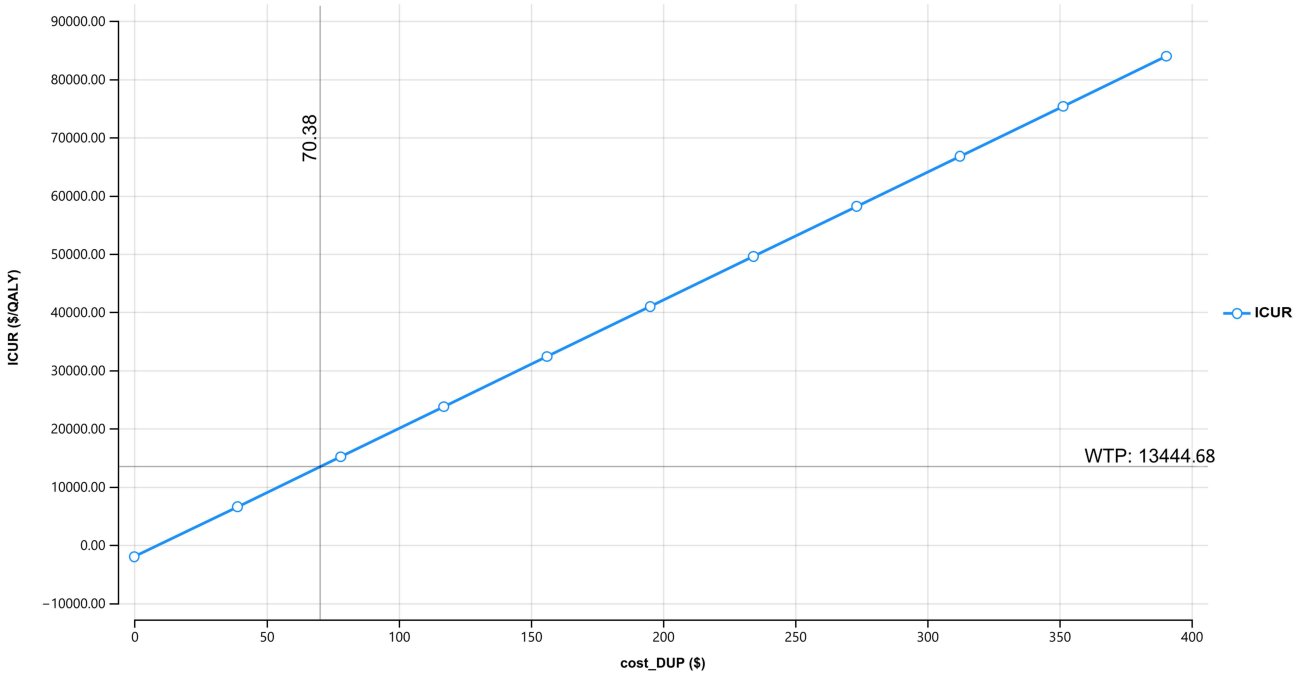

Figure 4 Scenario analysis of ICUR.
Notes: the correlation between the price changes of dupilumab and ICUR. When ICUR is equal to the WTP threshold, the price of dupilumab is $70.38.
Abbreviations: DUP, dupilumab; QALYs, quality-adjusted life years; WTP, willingness to pay; ICUR, incremental cost-utility ratio.

associated with the comparatively lower costs of maintenance medications in the control arm, many of which have been incorporated into China's VBP program, a centralized bulk-purchasing mechanism that has contributed to the substantial cost reductions for these therapeutic agents. Consequently, unless dupilumab demonstrates superior clinical efficacy relative to the current SoC strategy, Chinese patients may not be able to actively spend more expenditures to obtain these additional benefits.

Similarly, Antonio et al[8] likewise compared the economics of dupilumab add-on therapy and standard therapy in adolescent and adult patients with severe asthma in Colombia, but from a societal perspective, with an estimated ICUR of $50,160 per QALY gained, significantly higher than the WTP threshold of $19,000, indicating that dupilumab add-on therapy was not cost-effective and similar to our results. In contrast, Tohda et al in Japan[10] and Ali et al in Colombia[31] respectively conducted a Markov model to compare the cost-effectiveness of omalizumab, mepolizumab, benralizumab, and dupilumab as add-on therapies, and identified dupilumab as the dominant strategy. Conversely, Mareque et al[9] compared benralizumab, mepolizumab, and dupilumab and found benralizumab to be more economically favorable in Spain. These different conclusions are likely associated with regional variations in socioeconomic conditions and WTP thresholds. However, our study did not conduct economic comparisons with other biologics, primarily due to differential regulatory approvals in China. For example, omalizumab is indicated for severe allergic asthma with serum IgE 30–1500 IU/mL; mepolizumab targets severe eosinophilic asthma with blood eosinophils ≥150/μL or ≥300/μL, and dupilumab addresses type 2 inflammation or oral corticosteroid-dependent asthma characterized by blood eosinophils 150–1500/μL or FeNO ≥25 ppb, whereas benralizumab remains unapproved. The differences in the above-mentioned biomarkers were related to their clinical trial results, wherein these biologics exhibited variable therapeutic effectiveness across subgroups. The selection of biologic therapies for patients with severe asthma was primarily based on their biomarker profiles, while also taking the accessibility and affordability of medicine into consideration.[1,12] Previous evidence indicated that despite overlapping clinical manifestations between allergic and eosinophilic asthma, fewer than one-third of eosinophilic asthma patients qualify for omalizumab therapy,[32] a limitation potentially extrapolated to dupilumab. Moreover, it remains challenging to determine which agent is superior due to the lack of head-to-head data between different biologics among Chinese patients, which is also an

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obstacle to conducting research. Consequently, our study did not include other biologics as comparators to ensure clinical and pathophysiological consistency within the target population.

Our study has several limitations. First, the findings are only applicable to patients without comorbid diseases that might interfere with the evaluation of dupilumab or SoC (eg, atopic dermatitis or chronic rhinosinusitis with nasal polyps), and may not be generalizable to OCS-dependent asthma populations. In addition, the model assumed medication adherence to be 100%, whereas insufficient adherence in the real world, particularly for the SoC regimen, may compromise asthma control levels. We also excluded ICU admissions from the model due to the lack of detailed clinical outcome data for asthma patients in intensive care, potentially leading to an underestimation of costs for this particular population. However, a Chinese cross-sectional study[16] reported that only 2.3% of patients hospitalized for asthma exacerbations required ICU care; thus, the overall impact of ICU admissions on total medical expenditures may be limited and unlikely to significantly affect the results of our study. Furthermore, the insufficient data on transition probabilities stratified by relevant patient characteristics, such as age, ICS dose level, or blood eosinophil count, made it unfeasible to perform subgroup analyses in this study. Another possible limitation is that the applicability of data extrapolated from other countries may also not fully represent the characteristics of the Chinese population, as certain parameters lacked Chinese-specific studies. It is also essential to consider the potential discrepancies between real-world evidence and randomized controlled trials (RCTs), and future real-world studies conducted in Chinese populations should prioritize above aspects to further complement and refine the RCT-based results of our analysis. Despite standing these limitations, this study has validated inputs such as transition probabilities and treatment costs in the model by consulting local clinical experts, and sensitivity analyses were applied to verify the robustness of the results.

Conclusion

In conclusion, our results indicate that, compared with SoC therapy alone, dupilumab add-on therapy for uncontrolled severe asthma does not meet current cost-utility thresholds in China, which may not be a dominant selection for those with poor economic affordability unless there is a significant price reduction. These results also provide important economic evidence from a healthcare perspective for clinical decisions and policymakers in developing appropriate therapeutic strategies for severe asthma.

Data Sharing Statement

The data that support the findings of this study are available from the sources referred to the manuscript, reference list, and Table 1.

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Disclosure

The authors declare that they have no conflicts of interest in this work.

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