Cost-effectiveness analysis of single-inhaler triple therapy (FF/UMEC/VI) in COPD using the FULFIL trial: China medical insurance system perspective

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Conclusions

- Once-daily SITT with FF/UMEC/VI improved health outcomes and was the dominant (better outcomes at a cheaper price) treatment compared with BUD/FOR for patients with symptomatic COPD and a history of exacerbations in China
- FF/UMEC/VI may reduce the economic burden of COPD and should be considered by physicians as a preferred treatment option for patients with symptomatic COPD and a history of exacerbations in China

Background

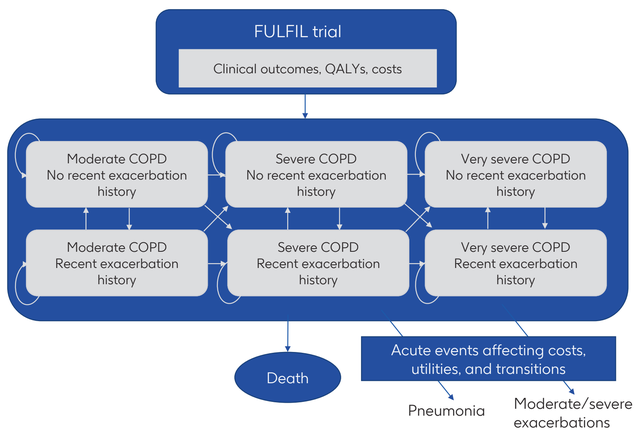
- Pharmacological management of COPD aims to improve symptoms and HRQoL, optimize lung function, and reduce the risk of exacerbation[1]
- Triple therapy with ICS + LABA + LAMA is recommended for patients on dual therapy who are symptomatic or continue to experience exacerbations[1]
  - SITT offers a convenient dosing strategy to improve compliance versus using multiple inhalers[2]
- Once-daily SITT with FF/UMEC/VI has been approved for COPD in China, has been listed in the China National Reimbursement Drug List, and has contract renewal until 2024
- In the randomized, double-blind, double-dummy, FULFIL trial, the safety and efficacy of 24 weeks of once-daily FF/UMEC/VI versus twice-daily BUD/FOR was evaluated[3]
- The objective of this study was to assess the cost-effectiveness of SITT, FF/UMEC/VI versus BUD/FOR for patients with symptomatic COPD and a history of exacerbations from a China medical insurance system perspective, based on data from the FULFIL trial

Methods

Model structure

- The analysis adapted a previously published hybrid decision tree/Markov economic model,[4] programmed in Microsoft Excel® (**Figure 1**)
- The initial trial-based decision tree model replicated the outcomes of the FULFIL trial (24 weeks)
- Outputs from the decision tree formed the starting position of the Markov economic model (1-year cycles), which comprised six health states based on COPD severity defined by FEV_1%Pred, and the presence/absence of recent exacerbations
- FEV_1 decline and exacerbation incidence were calculated by risk equations developed using data from the TORCH trial[6]

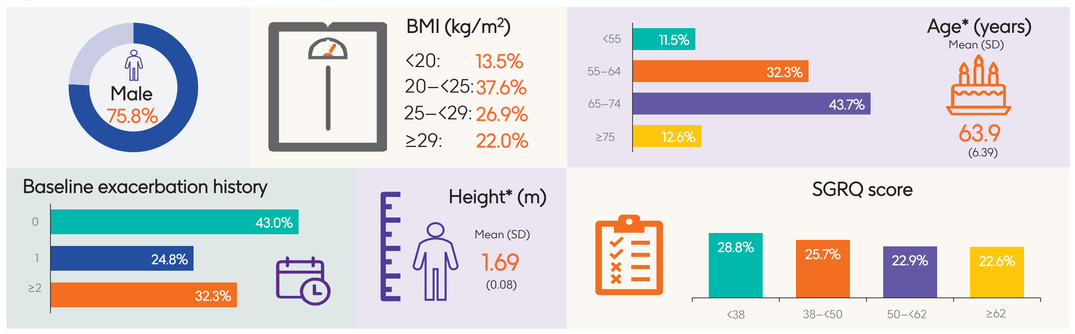
Figure 1: **Model structure[5]**



Model inputs

- Patient characteristics and clinical parameters: the age and height of patients in the FULFIL trial were used to determine FEV_1%Pred. Model risk equations were populated with baseline characteristics from TORCH (**Figure 2**). FF/UMEC/VI and BUD/FOR efficacy data were sourced from the FULFIL trial
- Resource use: drug costs were applied based on bidding prices from the government website and previously published literature[7] (¥2022)
- HRQoL: health state utilities were based on a cross-sectional study in China,[8] and disutilities of exacerbation events were sourced from published literature[9]

Figure 2: **Model inputs (patient characteristics)**



Data sourced from the TORCH trial. *Data sourced from the FULFIL trial.

Analyses

- The base-case analysis was conducted using a lifetime horizon, 5% annual discount rate, and treatment discontinuation in the trial period
- One-way sensitivity analyses and probabilistic sensitivity analyses were conducted to assess the robustness of results
- Scenario analyses were also conducted to examine the impact of alternative assumptions and model settings
- Model outcomes included predicted number of moderate/severe exacerbations, discounted LYs and QALYs, and total costs

Key model assumptions

- The FULFIL and TORCH trial populations are representative of the Chinese COPD population
- Risk of an exacerbation increases with increasing COPD severity (defined by decreasing FEV_1%Pred), and is higher for individuals who experienced an exacerbation during the previous year
- Treatment discontinuation only occurs in the trial period
- Rate of pneumonia is dependent only on the treatment received

Results

Base case

- Using a lifetime horizon, FF/UMEC/VI was the dominant treatment option compared with BUD/FOR (**Table 1**)
  - FF/UMEC/VI provided an additional 0.678 LYs and 0.703 QALYs compared with BUD/FOR, with a cost saving of ¥11,493 per patient per year
  - Patients on FF/UMEC/VI also had fewer exacerbations, with a reduction of 2.071 compared with those on BUD/FOR

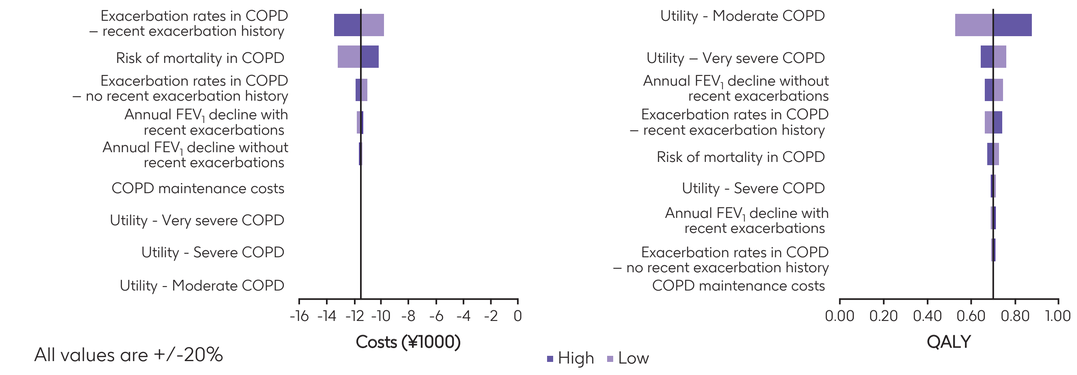
Table 1: **Base case**

Outcomes	FF/UMEC/VI	BUD/FOR	Incremental
Predicted exacerbations			
Moderate	2.529	4.182	-1.653
Severe	0.619	1.037	-0.418
Any	3.148	5.219	-2.071
Total LY	7.199	6.521	0.678
Total QALYs	4.797	4.094	0.703
Costs, ¥			
Maintenance	5002	4919	83
Moderate exacerbation	940	1592	-651
Severe exacerbations	10,861	18,710	-7849
Pneumonia	3000	2649	352
Treatment	18,615	20,495	-1880
Discontinuation	2954	4501	-1546
Total costs, ¥	41,372	52,865	-11,493

One-way sensitivity analysis

- FF/UMEC/VI remained the dominant treatment option across all one-way sensitivity analyses compared with BUD/FOR (**Figure 3**)
- The most significant drivers of variation in QALY gains were changes in the utility values for moderate (low value, 0.526; high value, 0.880) and very severe (low value, 0.762; high value, 0.645) COPD

Figure 3: **One-way sensitivity analyses**

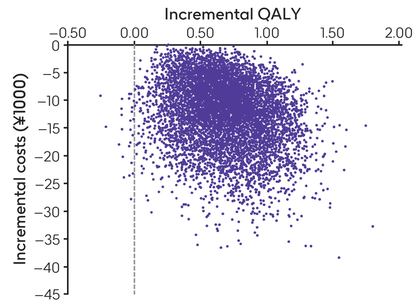


All values are +/-20%

Probabilistic sensitivity analyses

- In the probabilistic sensitivity analyses, FF/UMEC/VI remained the dominant treatment option across all the simulations compared with BUD/FOR (**Figure 4**)
- At a willingness-to-pay threshold of ¥80,976 (1 x 2021 GDP), FF/UMEC/VI had a 100% probability of being cost-effective versus BUD/FOR

Figure 4: **Incremental cost-effectiveness plane**



Scenario analyses

- FF/UMEC/VI remained the dominant treatment option across all scenario analyses compared with BUD/FOR (**Table 2**)

Table 2: **Scenario analyses**

Scenario	Base Case	Selection	FF/UMEC/VI ICER
Base case			Dominant
Discount rates (costs, benefits), %	5.0	0.0	Dominant
Discount rates (costs, benefits), %	5.0	8.0	Dominant
Bidding price for all drugs	Lowest bidding price across provinces	Median bidding price across provinces	Dominant
Health utilities	Wu[8] - health state; Cho[9] - decrement	Cho[9] - health state; Cho[9] - decrement	Dominant
Discontinuation data	FULFIL	Adelphi	Dominant
Direct treatment effect for exacerbations (5 years)	On - lifetime (36 years)	On - 5 years	Dominant
Treatment waning	Off	On	Dominant
In trial mortality	On	Off	Dominant
Treatment discontinuation	On	Off	Dominant
Replacement therapy	By treatment arm	By trial	Dominant

Limitations

- Due to the absence of long-term trial data, it was necessary to use data from the TORCH trial to parameterize the model, assuming that the patient population represented the Chinese population. However, the one-way sensitivity analyses results suggest that the model results were robust

Abbreviations

BMI, body mass index; BUD/FOR, budesonide/formoterol; COPD, chronic obstructive pulmonary disease; FEV_1, forced expiratory volume in one second; FEV_1%Pred, predicted FEV_1; FF/UMEC/VI, fluticasone furoate/umeclidinium/vilanterol; GDP, gross domestic product; HRQoL, health-related quality of life; ICER, incremental cost-effectiveness ratio; ICS, inhaled corticosteroid; LABA, long-acting beta agonist; LAMA, long-acting muscarinic antagonist; LY, life-year; QALY, quality-adjusted life-year; SD, standard deviation; SGRQ, St. George's Respiratory Questionnaire; SITT, single-inhaler triple therapy.

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Digital poster

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