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

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Conclusions

- Results from this cost-effectiveness analysis show that **FF/UMEC/VI is a dominant treatment option** versus UMEC/VI for patients with COPD in China
- Treatment with **FF/UMEC/VI resulted in improved quality of life and cost savings**; therefore, FF/UMEC/VI may reduce the economic burden of COPD and should be considered by physicians as a preferred treatment option

Background

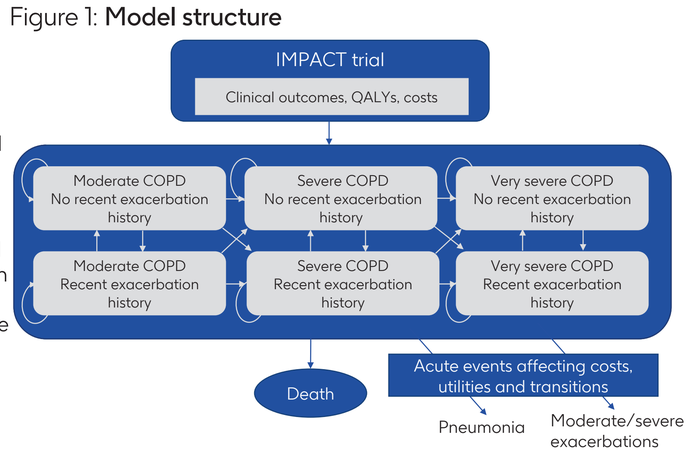
- Pharmacological therapy for stable COPD aims to improve symptoms, reduce the risk of exacerbations and improve HRQoL[1]
  - Current guidelines recommend triple therapy (ICS, LABA + LAMA) for patients with COPD who experience recurrent exacerbations while receiving dual therapy (LABA + LAMA)[1]
- A once-daily SITT with FF/UMEC/VI has been approved for patients with COPD in China
  - IMPACT– a randomised, double-blind, parallel-group trial – was conducted to investigate the safety and efficacy of 52 weeks of FF/UMEC/VI versus once-daily UMEC/VI[2]
- FF/UMEC/VI was listed on the China National Reimbursement Drug List through negotiation in 2020 and 2022, and has been renewed for a contract, valid for 2023–2024
- The objective of this study was to assess the cost effectiveness of FF/UMEC/VI versus UMEC/VI for patients with symptomatic COPD and a history of exacerbations from a China medical insurance system perspective, based on data from the IMPACT trial

Methods

Model structure

- The analysis adapted an existing published hybrid decision tree/Markov economic model, programmed in Microsoft Excel® (Figure 1)[3]
- The initial trial-based decision tree model replicated the outcomes of the IMPACT trial (52 weeks)
- Outputs from the decision tree formed the starting position of the Markov 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
- Decline in FEV_1 and risk of exacerbation over time were modelled by equations developed using data from TORCH, a landmark COPD trial following over 6000 patients for 3 years[4]

Figure 1: **Model structure**

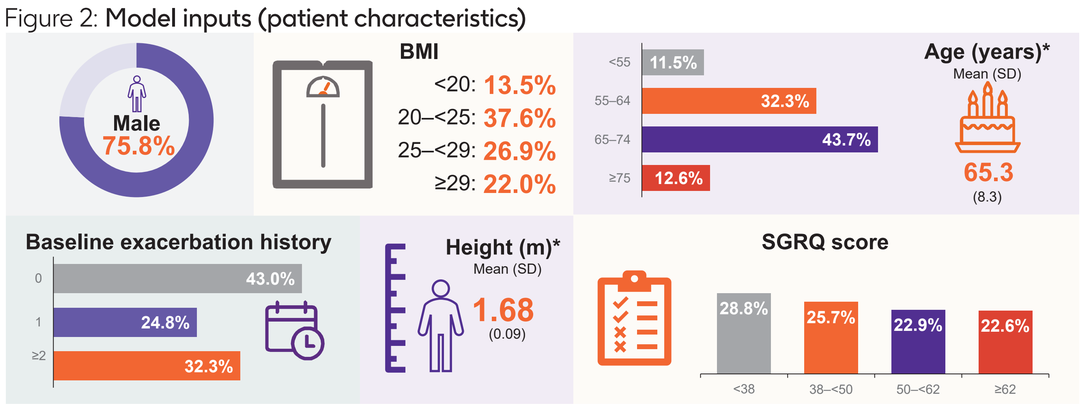


Model adapted from Fenwick et al. 2021[3]

Model inputs

- Patient characteristics and clinical parameters (Figure 2):
  - The decision-tree/trial-based model was informed directly by FF/UMEC/VI and UMEC/VI efficacy data from the IMPACT trial[5]
  - The age and height of patients from the IMPACT trial were used to determine FEV_1%Pred[5]
  - Baseline characteristics from the TORCH trial[4] were used for parameterising long-term decline in FEV_1, exacerbation rates, and pneumonia rates in the Markov model
- Resource use and unit costs: China healthcare resource unit and drug costs were applied based on government data and previously published literature (¥, 2021 for resource use and 2022 for treatments)[6,7]
- 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[4] unless otherwise specified; *Data sourced from the IMPACT trial.[5]

Analyses and outputs

- The base case analysis was conducted using a lifetime horizon, 5% annual discount rate and treatment discontinuation within the trial period
- One-way sensitivity and probabilistic sensitivity analyses were conducted to assess the robustness of the results to the uncertainty in input parameter values
- Scenario analyses were conducted to examine the impact of alternative assumptions and model settings
- Cumulative total exacerbations per person per year, discounted LYs and QALYs, and total costs for each treatment were calculated from the annual health cycle and cost outcomes predicted by the model

Key model assumptions

- The IMPACT and TORCH trial populations are representative of the Chinese COPD population likely to receive FF/UMEC/VI or UMEC/VI
- Mild exacerbations have a negligible impact on clinical and economic outcomes
- Individuals can only transition to increasingly severe states in the Markov model
- Treatment discontinuation only occurs within the trial period
- Pneumonia does not have a direct impact on mortality, and the rate of pneumonia is dependent only on the treatment received

Results

Base case

- Over a lifetime horizon, FF/UMEC/VI was the dominant treatment option compared with UMEC/VI (Table 1)
  - FF/UMEC/VI provided an additional 0.195 LYs and 0.261 QALYs compared with UMEC/VI, with a cost saving of ¥6003 per patient per year
  - Patients who received FF/UMEC/VI also had fewer exacerbations, with a reduction of 1.682 compared with those on UMEC/VI

Table 1: **Base case results***

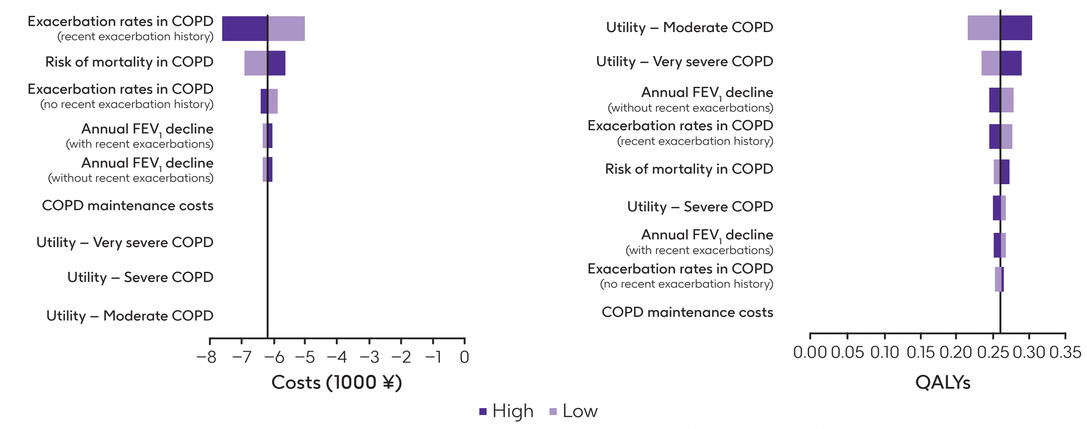
Outcomes	FF/UMEC/VI	UMEC/VI	Incremental
Predicted exacerbations			
Moderate exacerbations	3.315	4.657	−1.342
Severe exacerbations	0.772	1.112	−0.341
Any exacerbation	4.087	5.770	−1.682
Total LY	7.099	6.904	0.195
Total QALYs	4.632	4.372	0.261
Costs, ¥			
Maintenance	4872	4817	56
Moderate exacerbations	1334	1872	−538
Severe exacerbations	14,502	21,014	−6513
Pneumonia	4132	2574	1558
Treatment	17,031	14,096	2934
Replacement therapy	7575	11,075	−3500
Total costs, ¥	49,446	55,449	−6003

*Small discrepancies in values displayed in the table are due to differences in the rounding of decimals used in the models.

One-way sensitivity analysis

- FF/UMEC/VI was a dominant treatment option compared with UMEC/VI across all sensitivity analyses (Figure 3)
  - The most substantial drivers of variation in QALY gains were changes in the utility values for moderate (low value: 0.216, high value: 0.305) and very severe (low value: 0.268, high value: 0.253) COPD

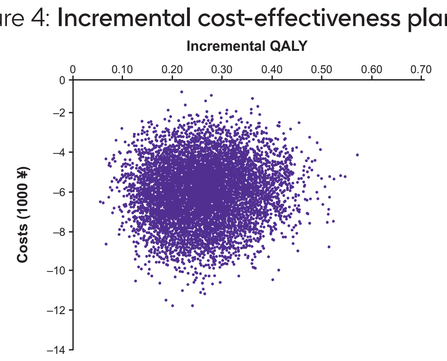
Figure 3: **One-way sensitivity analysis results**



Probabilistic sensitivity analyses

- In the probabilistic sensitivity analyses, FF/UMEC/VI remained the dominant treatment option for all simulations compared with UMEC/VI (Figure 4)
- At a willingness-to-pay threshold of ¥80,976 (1 × gross domestic product), FF/UMEC/VI had a 100% probability of being cost effective versus UMEC/VI

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



Scenario analyses

- FF/UMEC/VI remained a dominant treatment option compared with UMEC/VI across all scenario analyses (Table 2)

Table 2: **Scenario analyses results**

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 M et al. 2015[8] – health state; Cho S et al. 2015[9] – decrement	Cho S et al. 2015[9] – health state; Cho S et al. 2015[9] – decrement	Dominant
Direct treatment effect for exacerbations (5 years)	On – lifetime (34 years)	On – 5 years	Dominant
Treatment waning	No waning	Waning to 0 over the duration of treatment effect	Dominant
Treatment effect on exacerbations (post trial)	Lifetime (34 years)	No direct effect post trial	Dominant
Within-trial mortality	Yes	No	Dominant
Treatment discontinuation	Within trial period	No discontinuation	Dominant
Replacement therapy	By treatment arm in IMPACT	Pooled across all treatment arms in IMPACT	Dominant

Limitations

- As the model assumed treatment discontinuation in the first year only, the analysis did not account for treatment discontinuation in subsequent years. However, this was a reasonable assumption as discontinuation due to lack of efficacy or treatment-related adverse events (except pneumonia) is most likely to occur in the first year

Abbreviations

BMI, body mass index; COPD, chronic obstructive pulmonary disease; FEV1, forced expiratory volume in one second; FEV1%Pred, predicted FEV1 ; FF, fluticasone furoate; 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; UMEC, umeclidinium; VI, vilanterol.

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Disclosures

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Digital poster

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