Cost-effectiveness Analysis of Biosimilars and Novel Biologics for Patients with Moderate-to-severe Psoriasis

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Background

Moderate-to-severe psoriasis requires biologics or oral systemic therapies. Four out of 13 biologics agents have biosimilars approved. Previous studies have evaluated the cost-effectiveness of biologics and other commonly used therapies. However, it remains unknown about the cost-effectiveness of biosimilars and recently approved biologics. As biosimilars of adalimumab and infliximab launch to the market, we hypothesize that the these biosimilars are relatively more cost-effective than other biologics.

Objectives

This study aims to compare the cost-effectiveness of adalimumab and its biosimilars, infliximab and its biosimilars, brodalumab and bimekizumab in patients with moderate-to-severe psoriasis.

Methods

A Markov model *(fig. 1)* was constructed using TreeAge Pro. The study was conducted from US payer perspective over a 10-year horizon, with 16-week cycle length.

- Medication costs were derived as wholesale acquisition cost from the Redbook. Costs for laboratory tests and clinical visits were derived from the psoriasis report published by Institute for Clinical and Economic Review in 2018.
- Utilities were calculated using the Psoriasis Area and Severity Index (PASI).
- Transition probabilities were obtained from two network meta-analysis studies, presenting short-term and long-term transitions.
- All costs were reported as 2023 dollars. Future costs and effectiveness were discounted at 3% annually, with half-cycle correction.
- Deterministic and probabilistic sensitivity analyses were conducted to account for parameter uncertainties.

Patient characteristics

- We assumed a mean PASI of 20.3, mean age of 44.3 years old, and mean body weight of 89.3 kg
- Patients without adequate response can switch to subsequent therapy or non-targeted therapy.
- Responders are defined as those who achieve PASI75 or higher, whereas patients with lesser than PASI75 are defined as non-responders.
- Subsequent therapy is an equally weighted mix of all other biologics except the first-line agent.
- Non-targeted therapy includes apremilast and betamethasone dipropionate augmented 0.05% cream.

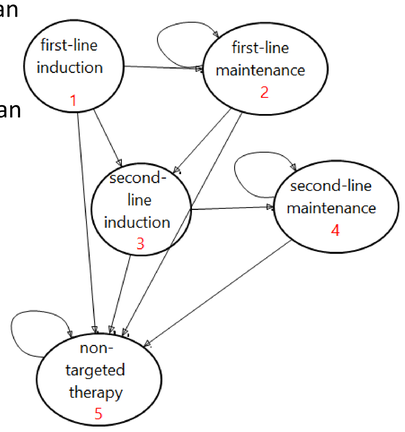

Fig.1 Markov model

Results

Base Case Analysis

In base-case analysis, biosimilars of infliximab had the lowest cumulative costs ($263,887.36), while bimekizumab had the highest cumulative costs ($363,556.94). Bimekizumab had the highest cumulative effectiveness of 18.75 QALY, while adalimumab and its biosimilars had the lowest cumulative effectiveness of 18.47 QALY. Infliximab biosimilars were the most cost-effective options among all comparators. The base-case ICERs were $202,241.35/QALY for brodalumab and $556,677.34/QALY for bimekizumab, compared to infliximab biosimilars *(fig. 2).* Patients in all arms had shifted to non-targeted therapy 10 years post-entry *(table 1).*

Deterministic and Probabilistic Sensitivity Analysis

Sensitivity analysis indicated that ICER was most sensitive to the cost of non-targeted therapy across all pairwise comparisons (*fig.3*). In 10,000 Monte Carlo simulations, at the willingness-to-pay level of $150,000/QALY, infliximab biosimilars has 70.8% of acceptability on the curve, followed by brodalumab (28.1%), bimekizumab (1%) and adalimumab (0.1%) *(fig. 4).*

Table 1. Percentage distribution 10 years after entry

Strategy	First-line maintenance	Subsequent therapy	Non targeted therapy
Infliximab Biosimilars	0.1%	0.1%	99.8%
Infliximab	0.1%	0.1%	99.8%
Brodalumab	3.1%	2.1%	94.6%
Adalimumab	0	0	1
Adalimumab Biosimilars	0	0	1
Bimekizumab	3.8%	2.6%	93.2%

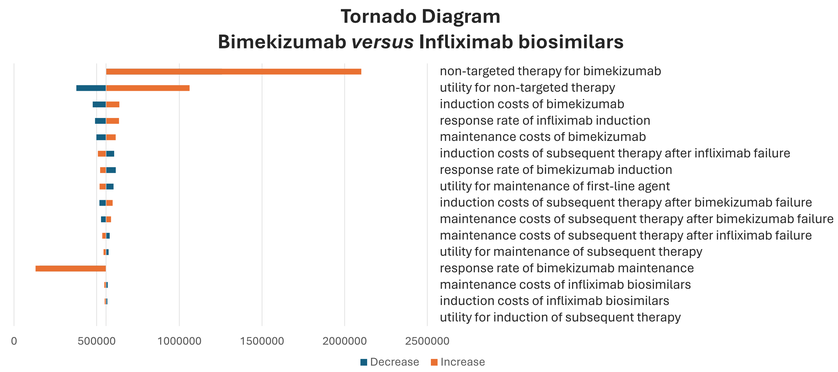

Fig.3 Tornado diagram presenting one-way deterministic sensitivity analysis comparing bimekizumab and infliximab biosimilars

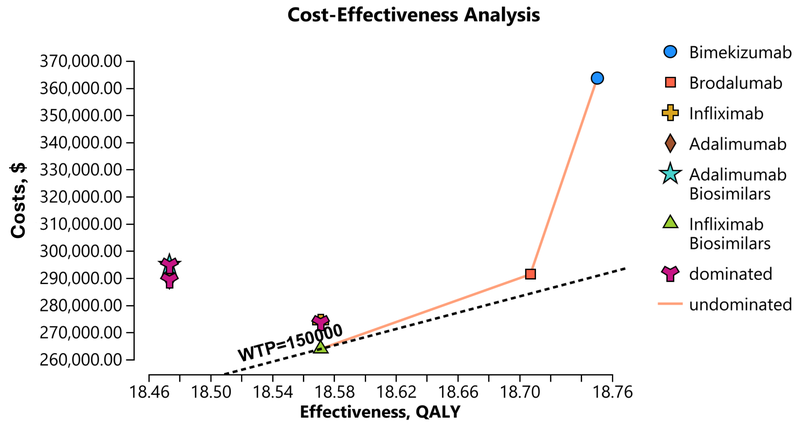

Fig.2 Cost-effectiveness plane

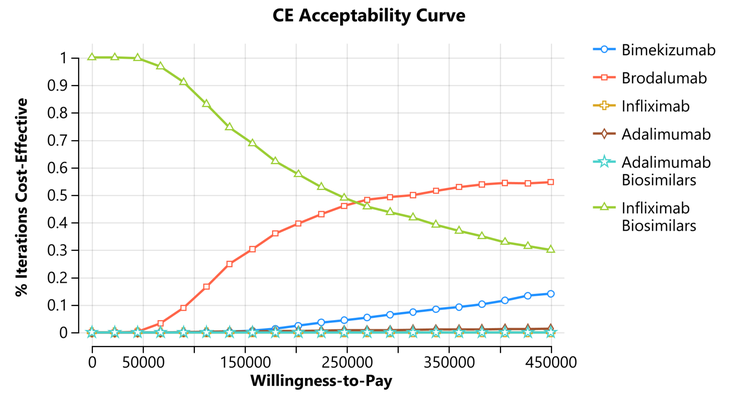

Fig.4 Cost-effectiveness acceptability curve

Limitations

- Adverse effects are not considered in this model, as most mild events could be self-limiting and severe conditions are rare.
- Disease-specific quality-of-life tool is available but data were inadequate to be utilized in this model.
- Given the high transition to non-targeted therapy, the model fails to account for reinitiation of targeted therapy.
- When data were collected in 2023, adalimumab biosimilars cost more than brand-name adalimumab. Results are likely to change with future market dynamics.

Conclusion

Biosimilars of infliximab were likely the most cost-effective option among all six treatment arms while bimekizumab was the least cost-effective option. Due to high switch rates, the results are sensitive to costs of non-targeted therapy. Future research is needed to include all available biologics and biosimilars agents.

Key references

Armstrong A, Fahrbach K, Leonardi C, et al. Efficacy of Bimekizumab and Other Biologics in Moderate to Severe Plaque Psoriasis: A Systematic Literature Review and a Network Meta-Analysis. *Dermatol Ther.* 2022;12(8):1777-1792. doi:10.1007/s13555-022-00760-8

Armstrong AW, Soliman AM, Betts KA, et al. Long-Term Benefit-Risk Profiles of Treatments for Moderate-to-Severe Plaque Psoriasis: A Network Meta-Analysis. Dermatol Ther. 2022;12(1):167-184. doi:10.1007/s13555-021-00647-0

Banken R, Agboola F, Ellis A, et al. *Targeted Immunomodulators for the Treatment of Moderate-to-Severe Plaque Psoriasis: Effectiveness and Value.* Institute for Clinical and Economic Review. June 12, 2018.

Matza LS, Brazier JE, Stewart KD, et al. Developing a preference-based utility scoring algorithm for the Psoriasis Area Severity Index (PASI). *J Med Econ.* 2019;22(9):936-944. doi:10.1080/13696998.2019.1627362

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