Cost-effectiveness of early intervention with biosimilars in rheumatoid arthritis patients in Hong Kong

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Background

Among patients with rheumatoid arthritis (RA) who had inadequate response to methotrexate, add-on economical leflunomide is recommended in before biological disease-modifying antirheumatic drugs (bDMARDs) despite suboptimal clinical efficacy. In Hong Kong, recently introduced biosimilar DMARDs share comparable efficacy and safety to the reference biologics with price reductions ranging from 54% to 87%, providing an opportunity for early access to optimal treatment. We aim to evaluate the cost-effectiveness of biosimilar DMARDs versus leflunomide to inform formulary listing decisions for biosimilars.

Method

From an institutional perspective in Hong Kong, a Markov disease transition model was developed to simulate the lifetime disease progression of patients with RA who failed with methotrexate. The model contains three competing treatment arms: biosimilar infliximab (CT-P13), biosimilar adalimumab (ABP-501), and leflunomide, all used concomitantly with methotrexate. Probabilistic and deterministic sensitivity analyses were conducted to address parameter uncertainties.

Model parameters

Transition probabilities

- The distributions of the American College of Rheumatology (ACR) score were sourced from randomized controlled trials (RCTs) of corresponding treatment.
- The probability of discontinuing subsequent treatments were obtained from a territory-wide electronic medical records database (Hong Kong CDARS).

Costs

- Drug acquisition costs sourced from local hospitals network.
- Management costs of adverse events (pneumonia, herpes zoster, tuberculosis, hepatitis B) resulting hospitalization.
- Supportive care costs including up to two times intra-articular steroid injections and bi-weekly community allied physiotherapy health service visits.

Utility

Patients' quality adjusted life years (QALYs) for each health states were generated by mapping Health Assessment Questionnaire - Disability Index (HAD-QI) score collected from RCTs with the formula: QALY = 0.74 − 0.17 × HAQ-DI

Results

Both biosimilars demonstrated lower costs and greater QALYs compared to Leflunomide. In the probabilistic sensitivity analysis (PSA), the probability of leflunomide, CT-P13, and ABP-501 being cost-effective strategy out of 10,000 iterations was 0%, 9%, and 91% at WTP threshold USD 48,555/QALY gain (one-time local GDP). In deterministic sensitivity analysis (DSA), the cost-effective conclusions remain unchanged varying all parameters over pre-defined range.

Conclusion

Biosimilar DMARDs are likely to be the cost-effective alternatives to leflunomide in the management of patients with RA who failed initial MTX treatment in Hong Kong. This study can serve to inform healthcare stakeholders, rheumatologists, and patients with the unmet needs of bDMARDs, about the benefits and financial feasibility of using of biosimilar DMARDs at earlier stage.

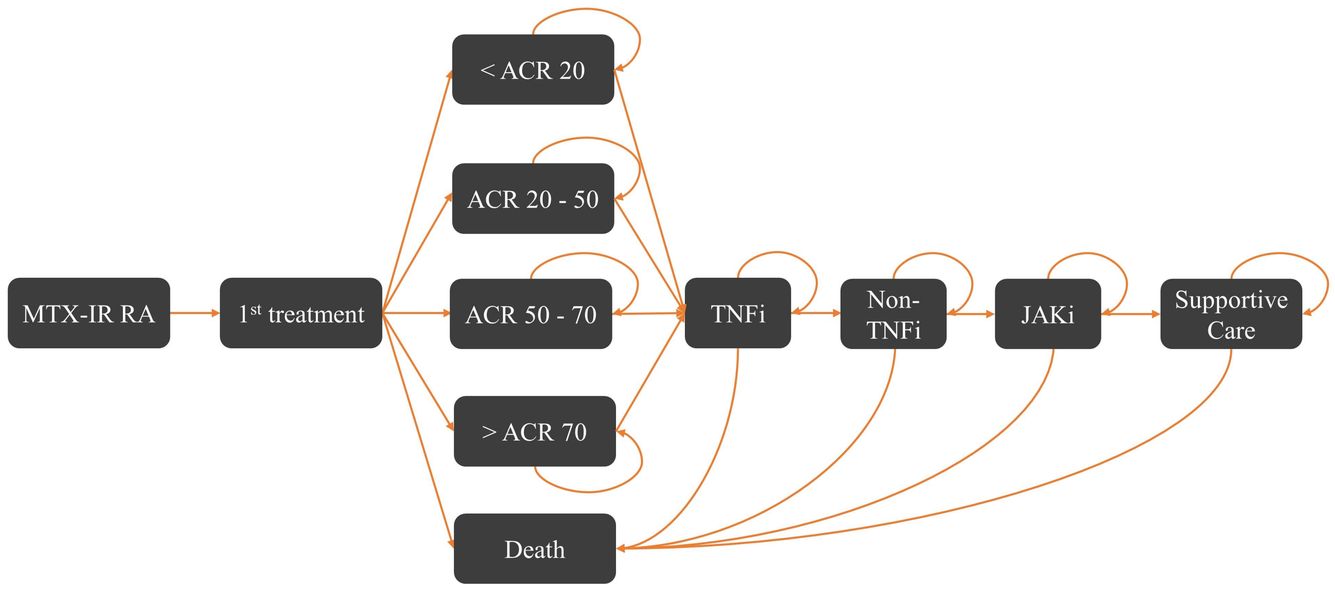

Figure 1. Transition diagram of Markov model

Strategy	Net Cost (USD)	Incremental cost (USD)	Net QALY	Incremental QALY	ICER (USD/QALY)
Main analysis					
Leflunomide	154,632	Ref	14.82	Ref	
CT-P13	152,326	-2306	15.35	0.53	Dominate
ABP-501	145,419	-9213	15.55	0.73	Dominate

Table 1. Lifetime cost and QALYs of three treatment arms

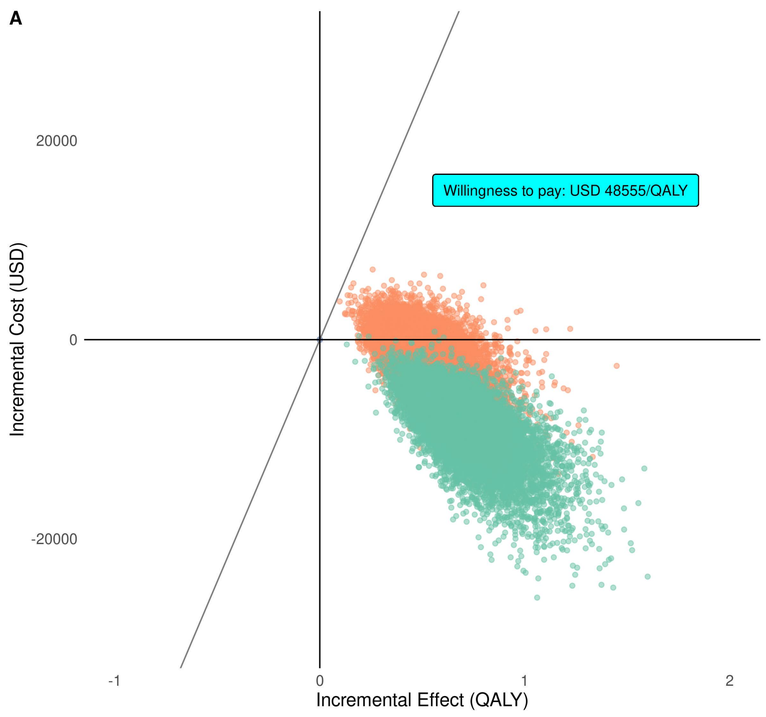

Figure 2: Simulation results of PSA

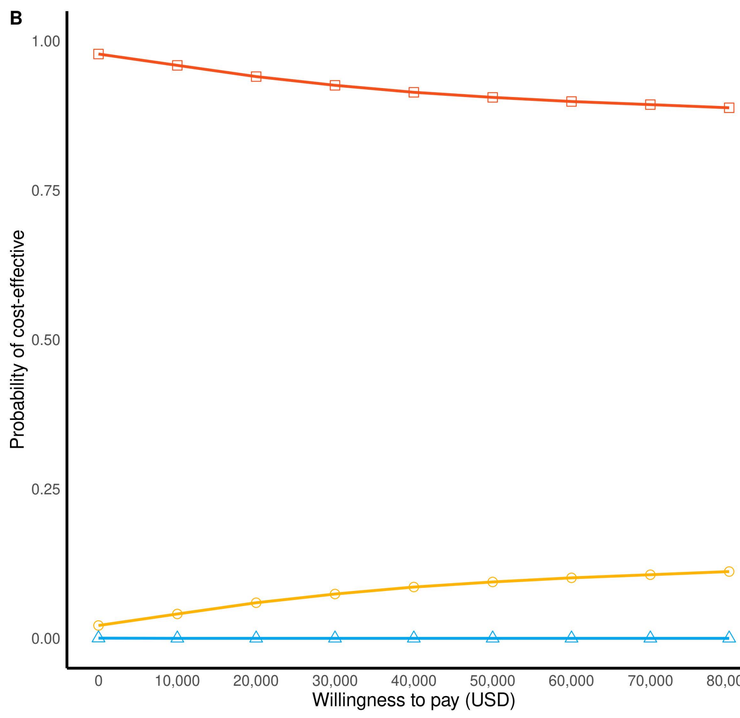

Figure 3: Cost-effectiveness acceptance curve

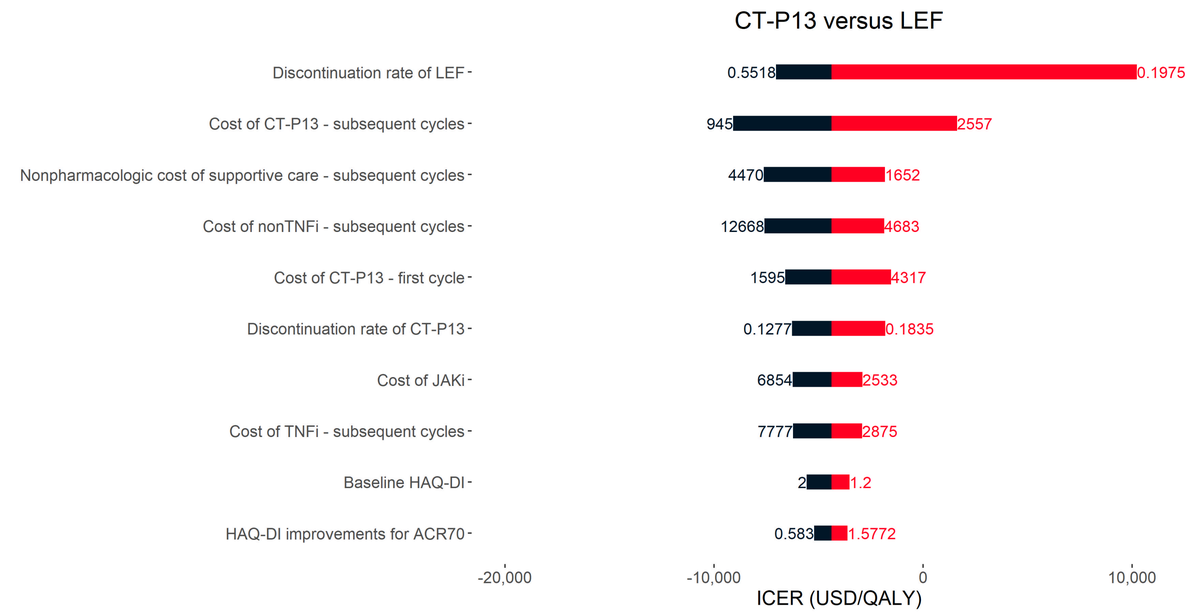

Figure 4. Top 10 influential factors for CT-P13 versus leflunomide

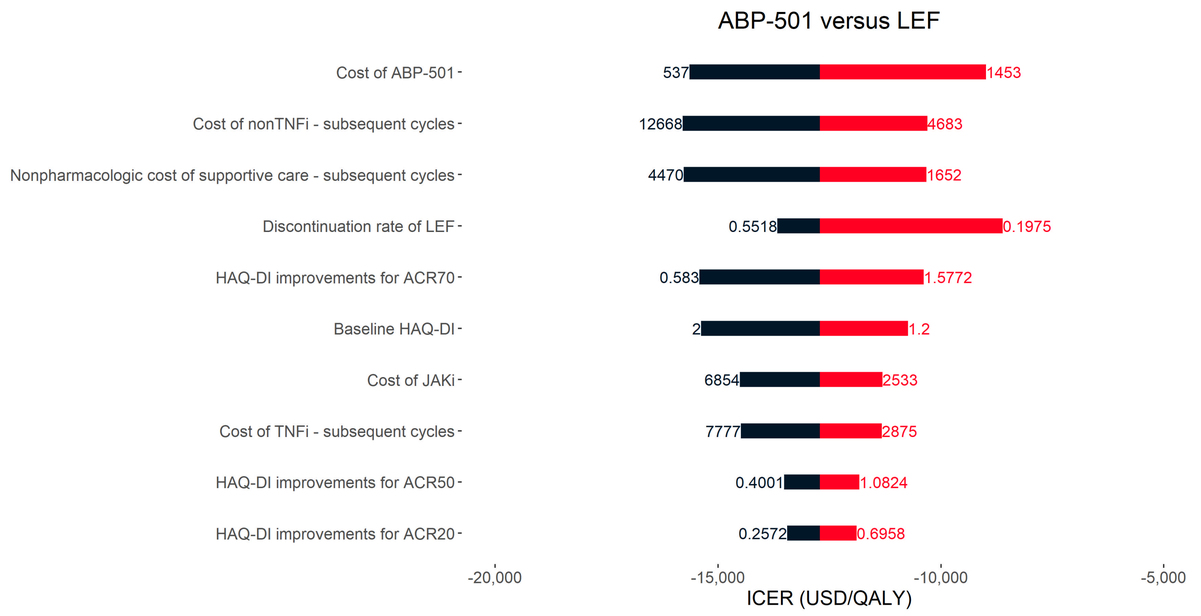

Figure 5. Top 10 influential factors for ABP-501 versus leflunomide

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