Impact of Different Mapping Algorithms from Disease-Specific Measures to EQ-5D on Cost-Effectiveness Analysis in Atopic Dermatitis



Kondo Tomohiro¹⁾, Yamato Kentaro¹⁾²⁾, Zhang Yilong¹⁾

1) Otsuka Pharmaceutical Co., Ltd., Tokyo, Japan

2) Department of Public Health, Graduate School of Medicine, Juntendo University, Tokyo, Japan

INTRODUCTION & OBJECTIVE

- EQ-5D, a preference-based measure, is viewed as the gold standard for measuring utility in cost-effectiveness analysis (CEA)¹. However, clinical trials frequently omit EQ-5D and instead use disease-specific measures².
- Several mapping algorithms have been developed for patients with atopic dermatitis to convert disease-specific measures to EQ-5D utility values, which have frequently been used in CEA. There are multiple algorithms to choose from³⁾⁴⁾⁵⁾, and the choice of algorithm will affect the incremental cost-effectiveness ratio (ICER).
- However, there are currently no published reports that evaluate and consider the use of multiple algorithms in Japan. Accordingly, the

aim of this study was to determine the impact of different mapping algorithms on the results of CEA.

METHODS

- EQ-5D-5L, Dermatology Life Quality Index (DLQI), and pruritus visual analog scale (VAS) scores were extracted from 2,817 individuals diagnosed with atopic dermatitis (AD) using data from the mHealth app "kencom" (DeSC Healthcare).
- Incremental quality-adjusted life-years (QALYs) and ICER for delgocitinib versus difamilast in patients with moderate to severe AD were compared using utility measured directly via EQ-5D-5L and utility values mapped from the DLQI and pruritus VAS.
- A Markov model was used, with four health states: "clear," "mild," "moderate," and "severe"⁶⁾. The time horizon of this analysis was one year, and the analysis was conducted from the perspective of Japanese payers.
- The same model and assumptions were used but with a different mapping algorithm.



Figure 1. Markov model



Table 1: Mapping algorithms used in the model

Number	Mapping algorithm	Algorithm	Algorithm type
1	EQ-5D-5L measured directly	Clear AD: 0.9070, Mild AD: 0.8821, Moderate AD: 0.8625, Severe AD: 0.8450	Health state
2	Park ³⁾	Utility = $1.37778 - (0.00807 \times \text{pruritus-VAS score}) - (0.01082 \times \text{age}) + (0.00013 \times \text{age}^2) + (0.00145 \times \text{sex (female=1)})$	Linear regression
3	Ali ⁴⁾	$P(Y=1) = \frac{1}{1 + e^{(-a_1 + b_1 x_1 + b_2 x_2 + \dots + b_m x_m)}} P(Y=2) = \frac{1}{1 + e^{(-a_2 + b_1 x_1 + b_2 x_2 + \dots + b_m x_m)}} - P(Y=1)$	Ordinal logistic regression
4	Vilsbøll AW ⁵⁾	Utility = $0.976 - (0.012 \times \text{total DLQI}) - (0.001 \times \text{age}) + (0.014 \times \text{sex(female=1)})$	Regression mixture
0.08	8	¥9,000,000	
0.0'	7	¥8,000,000	
S 0.0	6	¥7,000,000	
	5	¥6,000,000	
		¥5,000,000	
uent.	4	⊇¥4,000,000	
0.0	3	¥3,000,000	





Figure 2. Incremental QALYs for difamilast vs. delgocitinib and difamilast vs. placebo Figure 3. ICER for difamilast vs. delgocitinib and difamilast vs. placebo

CONCLUSION

The choice of different mapping algorithms can substantially impact the ICER and incremental QALYs in the evaluation of patients with AD. Therefore, the use of multiple algorithms in CEA should be considered.

References

- 1) Zisis K, Naoum P, Athanasakis K. Qualitative comparative analysis of health economic evaluation guidelines for health technology assessment in European countries. Int J Technol Assess Health Care. 2020;37:e2. Published 2020 Dec 10.
- 2) Chuang LH, Whitehead SJ. Mapping for economic evaluation. Br Med Bull. 2012;101:1-15. doi:10.1093/bmb/ldr049
- 3) Park SY, Park EJ, Suh HS, Ha D, Lee EK. Development of a transformation model to derive general population-based utility: Mapping the pruritus-visual analog scale (VAS) to the EQ-5D utility. J Eval Clin Pract. 2017;23(4):755-761.
- 4) Ali FM, Kay R, Finlay AY, et al. Mapping of the DLQI scores to EQ-5D utility values using ordinal logistic regression. Qual Life Res. 2017;26(11):3025-3034.
- 5) Vilsbøll AW, Kragh N, Hahn-Pedersen J, Jensen CE. Mapping Dermatology Life Quality Index (DLQI) scores to EQ-5D utility scores using data of patients with atopic dermatitis from the National Health and Wellness Study. Qual Life Res. 2020;29(9):2529-2539.
- 6) McManus E, Sach T, Levell N. The Use of Decision-Analytic Models in Atopic Eczema: A Systematic Review and Critical Appraisal. Pharmacoeconomics. 2018;36(1):51-66.