Disease-Specific Quality-of-Life Measures Mapped to the EQ-5D in a Chronic Disorder With Recurrent Attacks: Analysis of the DELIVER Trial in Patients With Migraine

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KEY POINTS

- Utility measures with a short recall period, such as EQ-5D, may not fully capture the impact of migraine on a patient's quality of life and daily functioning.
- The results highlight the importance of a recall period greater than 1 day to appropriately capture the impact of migraine on utilities.

CONCLUSIONS

- The MSQ and HIT-6 are more predictive of change in MMDs than the EQ-5D-5L, capturing improvements in migraine disease burden that correspond with reductions in MMDs.
- An investigation of different approaches that may be used to generate health utility data is needed.

Introduction

- Migraine is a common and disabling neurologic disorder that negatively affects multiple areas of functioning, both during and between migraine episodes.[1–3]
  - Migraine is a chronic (i.e., long-term) disease defined by recurring acute events, such as monthly migraine days (MMDs), and is typically subdivided into episodic and chronic migraine based on the number of monthly headache/migraine days experienced.[4]

- Utilities aim to quantify patients' health-related quality of life across a wide range of diseases, but there are limited data on the utility of preventive treatment of migraine.[5,6]

- The EQ-5D (3 level, 3L, or 5 level, 5L version) is a generic and commonly used measure of obtaining utilities for health economics modeling, but for a disorder such as migraine, the Migraine-Specific Quality of Life Questionnaire (MSQ) and the 6-item Headache Impact Test (HIT-6) may be preferred.[6–10]
  - People living with migraine experience symptoms that fluctuate in severity and frequency from day to day; therefore, 4-week recall tools (MSQ and HIT-6) may be more useful than 1-day recall tools (EQ-5D).[10–12]

- In this post hoc analysis of the DELIVER (NCT04418765) migraine-prevention trial, we compared utilities estimated from 3 patient-reported outcome (PRO) measures—EQ-5D-5L, MSQ, and HIT-6—to assess the extent to which these measures capture migraine impact.[13]

Objectives

- To compare PROs from DELIVER and determine which utility measure is the most suitable for capturing migraine impact and improvement.

Methods

- Utilities were estimated for each study visit (up to 24 weeks) at which the HIT-6, MSQ, and/or EQ-5D-5L was completed.

- In addition to valuing the collected EQ-5D-5L health states using Canadian EQ-5D-5L valuation sets, utility scores were also derived by mapping MSQ and HIT-6 to EQ-5D-3L domain scores using previously published algorithms.[14]
  - Each algorithm has 2 versions that were assigned to patients with either episodic or chronic migraine. These versions remained consistent across study visits, with utilities calculated for each visit using each patient's MMDs in the previous 4-week period.
  - In the first model versions, only MSQ and HIT-6 scores were used to calculate utilities. In the second model versions, in addition to MSQ or HIT-6, the following covariates were used: age, sex, race, work productivity, headache medication use, and comorbidities.

- A mixed linear model comparing number of MMDs and utility score was estimated for utility scores derived from each PRO.

- The base-case model estimated the relationship between utilities and MMDs independent of treatment group ("pooled" treatment effect), using MSQ-derived utility scores.

- The base-case model was replicated for HIT-6 and EQ-5D utilities.

Results

- The mapping parameters of the mixed linear models are shown in **Table 1**.
  - For a 1 MMD reduction, there are larger increases in disutility, on average, in the MSQ and HIT-6 compared with the EQ-5D-5L.

Table 1. Estimated linear relationship between disutilities (HIT-6, MSQ, and EQ-5D-5L) and MMDs

Source of Utility and Method	Model variable	Disutility estimate	Standard Error	95% Confidence Interval	P-value
MSQ-derived	Intercept*	0.2062	0.0063	(0.1939 – 0.2185)	<0.001
	Monthly migraine days	0.0189	0.0004	(0.0180 – 0.0198)	<0.001
HIT-6-derived	Intercept*	0.1202	0.0055	(0.1093 – 0.1311)	<0.001
	Monthly migraine days	0.0188	0.0004	(0.0181 – 0.0195)	<0.001
Direct assessment, EQ-5D-5L	Intercept*	0.0813	0.0040	(0.0734 – 0.0892)	<0.001
	Monthly migraine days	0.0053	0.0003	(0.0048 – 0.0059)	<0.001

*The intercept is the disutility experienced by DELIVER patients at 0 MMDs. Disutility estimates are 1.0–utility score. HIT-6, 6-item Headache Impact Test; MSQ, Migraine-Specific Quality of Life.

- Analysis of HIT-6 showed a similar relationship with changes in MMDs as the base-case model using MSQ-derived utility scores, while EQ-5D-5L showed less of a response to changes in MMDs (**Figure 1**).
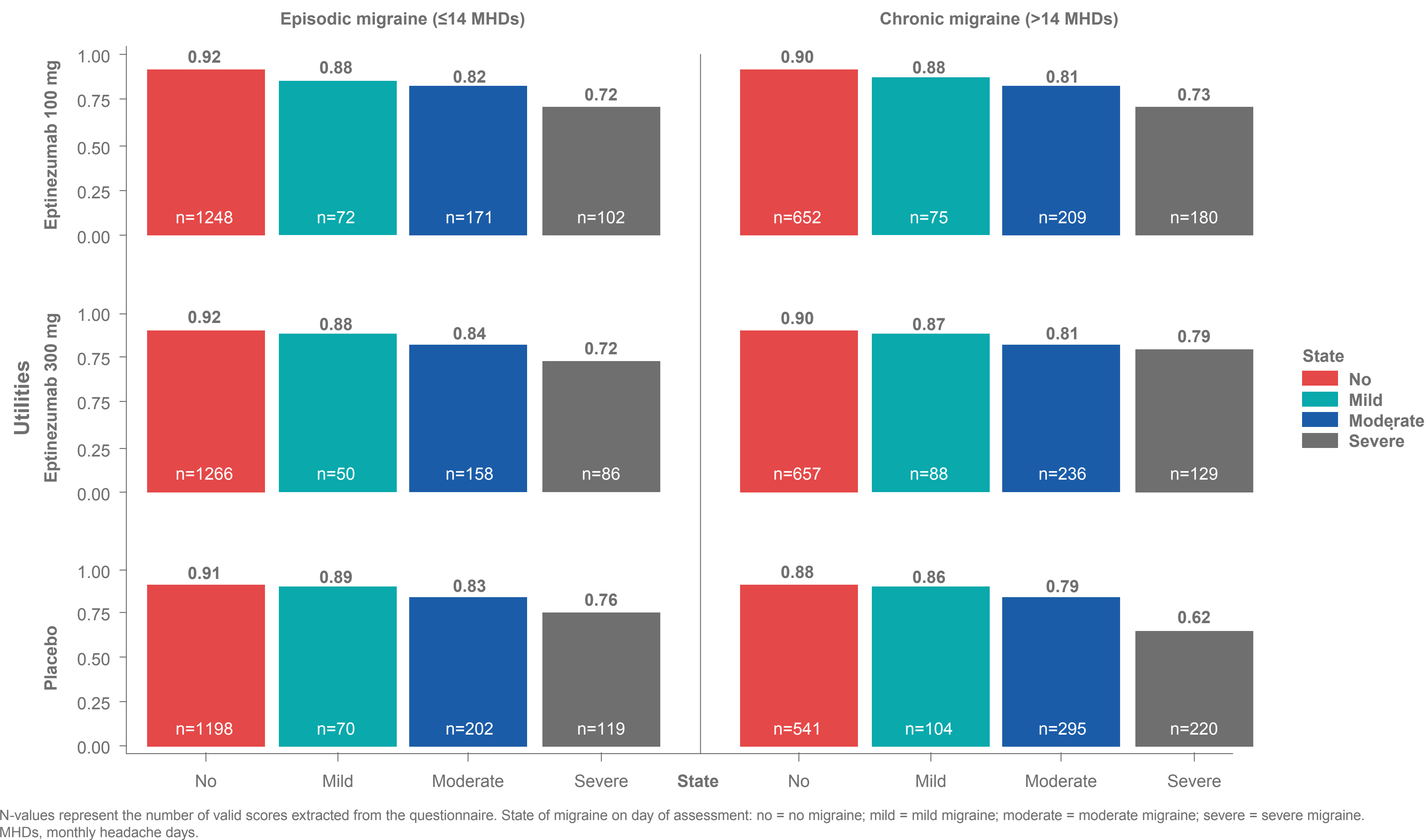
Figure 1. Estimated linear relationship between utilities (HIT-6, MSQ, and EQ-5D-5L) and MMDs, which shows the sensitivity to changes in MMDs
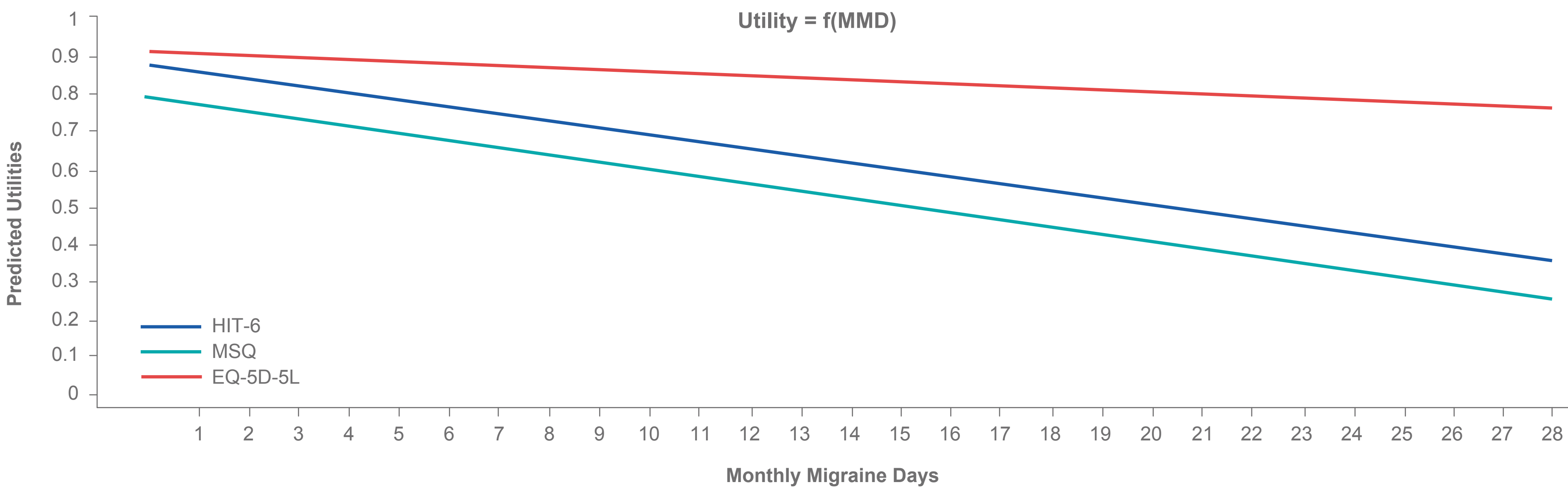
HIT-6, 6-item Headache Impact Test; MSQ, Migraine-Specific Quality of Life; MMDs, monthly migraine days.

- Stratifying patients (n=890, full analysis set) by episodic versus chronic migraine (≤14 vs >14 monthly headache days) shows that utilities derived from EQ-5D-5L depend on the presence and severity of migraine on the day of the patients' completion of the EQ-5D-5L estimate. (**Figure 2**).
  - The migraine state and severity on the specific day of assessment was found to impact this utility measure.

Figure 2. Estimation of EQ-5D-5L utility values on the day of assessment by treatment arm, migraine frequency, and migraine severity.

N-values represent the number of valid scores extracted from the questionnaire. State of migraine on day of assessment: no = no migraine; mild = mild migraine; moderate = moderate migraine; severe = severe migraine. MHDs, monthly headache days.

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