

# Patient Preferences and Health State Utilities Associated with Frequency of Basal Insulin Administration for Type 1 and Type 2 Diabetes

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## BACKGROUND AND OBJECTIVES

- Available basal insulins such as insulin glargine and insulin degludec are administered daily.<sup>1,2</sup> Several novel molecules have been designed as once-weekly basal insulins.<sup>3,4</sup>
- Treatment process attributes such as frequency of administration can impact patients' quality of life, treatment preference, and treatment adherence.<sup>5,6</sup>
- Patients' preferences for treatment process attributes can be quantified as impact on health state utilities, which can be used to represent these preferences in cost-utility analyses.<sup>7</sup> While previous research has estimated utilities associated with injection frequency for people with type 2 diabetes (T2D), there are no known utility values for injection frequency among people with type 1 diabetes (T1D).<sup>8</sup>
- The purpose of this study was to estimate utility differences between daily and weekly basal insulin administration based on preferences of individuals with T1D and T2D.

## CONCLUSION

- Weekly basal insulin was generally preferred over daily basal insulin by respondents with both T1D and T2D, although some (8%) preferred daily basal insulin.
- The resulting utilities may be useful in cost-effectiveness models examining the value of weekly basal insulin treatment for T1D and T2D.

## METHODS

### Study Design

- Utilities were estimated in a vignette-based time trade-off (TTO) utility elicitation study.
- Interviews were conducted in-person with people with T1D and T2D in three locations in the United Kingdom (Manchester, London, and Edinburgh) in April 2024.

### Participants

- All participants were required to be ≥18 years old at the time of enrollment and to have had a diagnosis of T1D or T2D for at least 6 months. Participants were also required to be currently receiving medication treatment for their diabetes and to provide proof of this treatment (e.g., a photo of the medication or medication packaging, a prescription note, a letter from their doctor/nurse/hospital/clinic/surgery).

### Health State Vignettes

- Two sets of health states were developed for valuation by patients with T1D and T2D. All health states included a description of diabetes, blood glucose control, and long-acting insulin. Health states valued by patients with T1D also included a description of meal-time insulin, and health states valued by patients with T2D included a description of oral medication (see example health state in **Figure 1**).
- Participants with T1D valued two health states differing in frequency of basal insulin injections (A: daily and B: weekly), and participants with T2D valued three health states (C: oral medication only [no long-acting insulin or other injectable medication], D: oral medication with daily basal insulin, E: oral medication with weekly basal insulin).

### Pilot Study

- A pilot study was conducted to finalize the interview procedures and health state descriptions. Interviews were conducted with eight respondents with T1D (mean age = 28.9 years; 50% female) and 18 respondents with T2D (mean age = 49.7 years; 50% female).
- Participants completed health state valuation tasks and then provided feedback on health states and interview procedures. Minor revisions were made to the health states based on participant feedback to improve clarity.

### Procedures

- Participants first completed an introductory ranking task and rated their preference for once-daily or once-weekly basal insulin on a 7-point scale ranging from "strongly prefer daily" to "strongly prefer weekly." Then, participants valued the health states in a TTO task with a 20-year time horizon and 5% (1 year) trading intervals.
- After completing the TTO portion of the interview, the participants also completed a demographic and clinical information form.

## RESULTS

### Sample Description

- A total of 86 participants with T1D and 203 participants with T2D completed interviews (**Table 1**).

**Table 1. Demographic and Clinical Characteristics**

Characteristics	T1D (N=86)	T2D (N=203)	Total Sample (N=289)
Age (years), Mean, (SD)	36.6 (13.3)	55.1 (11.0)	49.6 (14.5)
Gender, n (%)			
Male	37 (43.0%)	103 (50.7%)	140 (48.4%)
Female	48 (55.8%)	98 (48.3%)	146 (50.5%)
Nonbinary	1 (1.2%)	2 (1.0%)	3 (1.0%)
Ethnicity, n (%)			
Asian/Asian British	2 (2.3%)	21 (10.3%)	23 (8.0%)
Black/African/Caribbean/ Black British	1 (1.2%)	11 (5.4%)	12 (4.2%)
White	80 (93.0%)	157 (77.3%)	237 (82.0%)
Mixed/Multiple ethnic groups	3 (3.5%)	8 (3.9%)	11 (3.8%)
Other	0 (0.0%)	6 (3.0%)	6 (2.1%)
Current medication for diabetes, n (%)			
Oral medication only	-	149 (73.4%)	149 (51.6%)
Insulin only	78 (90.7%)	7 (3.4%)	85 (29.4%)
Non-insulin injectable medication only	-	1 (0.5%)	1 (0.3%)
Oral medication and insulin	8 (9.3%)	23 (11.3%)	31 (10.7%)
Oral medication and non-insulin injectable medication	-	17 (8.4%)	17 (5.9%)
Insulin and non-insulin injectable medication	-	2 (1.0%)	2 (0.7%)
Oral medication, insulin, and non-insulin injectable medication	-	2 (1.0%)	2 (0.7%)
Other medication only	-	2 (1.0%)	2 (0.7%)
Type of current insulin, n (%)			
Basal insulin only	5 (5.8%)	17 (50.0%)	22 (18.3%)
Mealtime insulin only	9 (10.5%)	6 (17.6%)	15 (12.5%)
Basal insulin and mealtime insulin	72 (83.7%)	9 (26.5%)	81 (67.5%)
Other insulin (e.g., biphasic insulin)	-	2 (5.9%)	2 (1.7%)
Route of administration for current insulin, n (%)			
Injection	50 (58.1%)	34 (100.0%)	84 (70.0%)
Pump	35 (40.7%)	-	35 (29.2%)
Both injection and pump	1 (1.2%)	-	1 (0.8%)
Time since diabetes diagnosis (years), Mean (SD)	18.1 (12.1)	8.9 (7.3)	11.7 (9.9)

Abbreviations: SD = standard deviation; T1D = type 1 diabetes; T2D = type 2 diabetes

### Health State Ranking and Preferences

- Most participants with T1D (79.1%) preferred weekly basal insulin over daily basal insulin in the ranking task.
- Nearly all participants with T2D (99.0%) preferred oral medication only over both health states with basal insulin and most (96.1%) preferred weekly basal insulin over daily basal insulin.

**Figure 1. Sample Health State (Type 2 Diabetes with Once-Weekly Basal Insulin)**

<b>Diabetes</b>	<ul style="list-style-type: none"><li>You have had diabetes for several years. This means that your body does not produce enough insulin or use enough of the insulin that it produces.</li><li>Insulin is a naturally occurring substance that controls the amount of sugar in your body.</li></ul>
<b>Blood Sugar</b>	<ul style="list-style-type: none"><li>In order to maintain control of your diabetes, you manage your blood sugar level through diet, exercise, and medication.</li><li>Your blood sugar mostly stays <b>within a target range</b> that is not considered hypoglycaemia (too low) or hyperglycaemia (too high).<ul style="list-style-type: none"><li>If your blood sugar level is <b>too low</b>, you may experience dizziness/light-headedness, sweating, or shaking.</li><li>If your blood sugar level is <b>too high</b>, you may experience tiredness, blurred vision, thirst, or frequent urination.</li></ul></li></ul>
<b>Oral Medication</b>	<ul style="list-style-type: none"><li>You take <b>oral medication (pills or tablets)</b> every day.</li></ul>
<b>Insulin (once each week)</b>	<ul style="list-style-type: none"><li>You give yourself an injection of long-acting insulin <b>once each week</b>.</li></ul>

### Health State Ranking and Preferences (continued)

- Common reasons for preferring weekly administration included the convenience of injecting once weekly (e.g., fewer disruptions to daily life, not needing to bring medication or supplies to inject away from home), disliking injections and preferring to administer the injections less often, and ease of remembering injections on one day each week.
- Among the smaller number of respondents who preferred daily administration, reasons included familiarity with daily insulin, ease of remembering basal insulin in a daily routine, and ability to adjust insulin dose to account for daily activity levels.
- Preference scale results are presented in **Table 2**.

**Table 2. Health State Rating Scale<sup>a</sup>**

	N	Preference Rating (%)						
		Prefer daily basal insulin			Prefer weekly basal insulin			
		Strongly	Moderately	Slightly	No preference	Slightly	Moderately	Strongly
Total Sample	289	11 (3.8%)	8 (2.8%)	4 (1.4%)	3 (1.0%)	25 (8.7%)	48 (16.6%)	190 (65.7%)
T1D	86	8 (9.3%)	6 (7.0%)	3 (3.5%)	1 (1.2%)	8 (9.3%)	19 (22.1%)	41 (47.7%)
T2D	203	3 (1.5%)	2 (1.0%)	1 (0.5%)	2 (1.0%)	17 (8.4%)	29 (14.3%)	149 (73.4%)

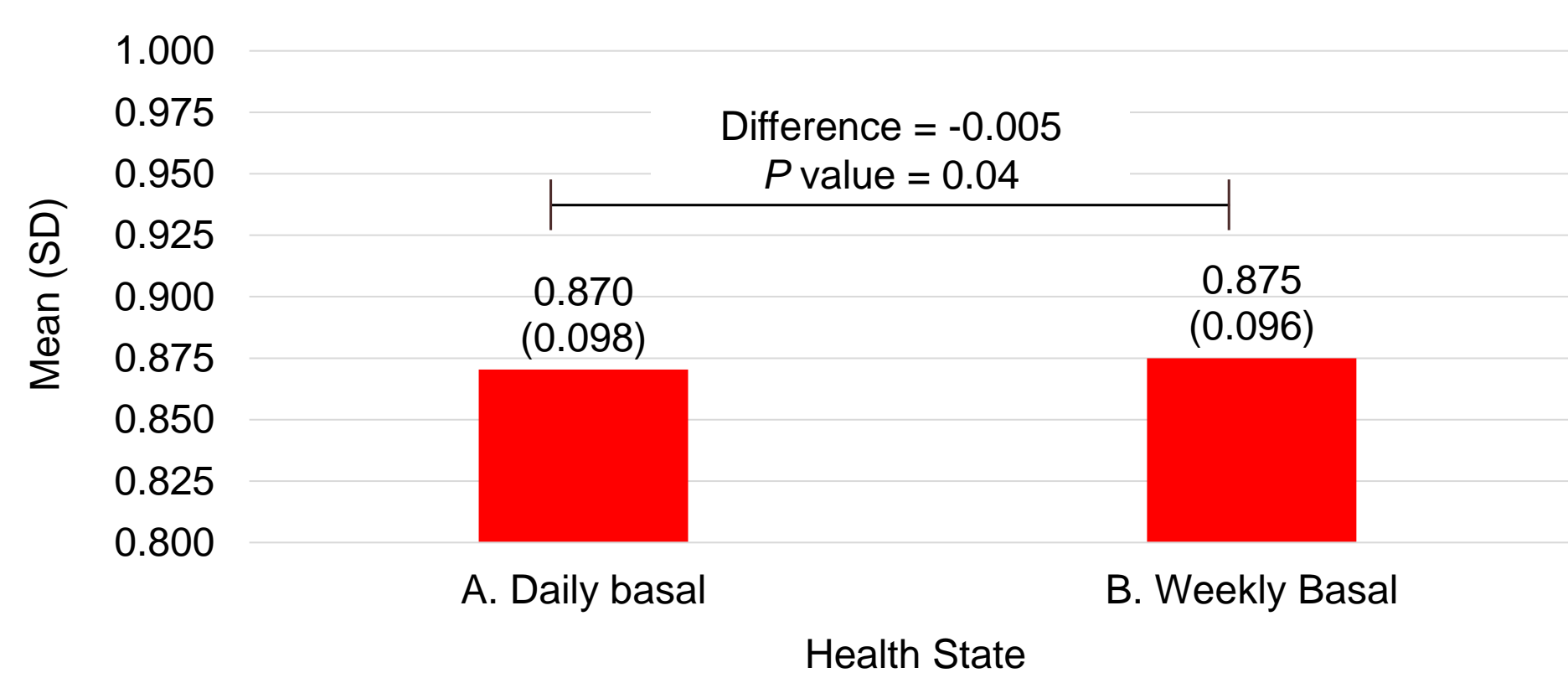
Abbreviations: T1D = type 1 diabetes; T2D = type 2 diabetes

<sup>a</sup> Preference Rating Scale for Frequency Health States: "1. Please select the number on the scale below that best describes your preference between daily and weekly administration of long-acting insulin."

### Health State Utilities

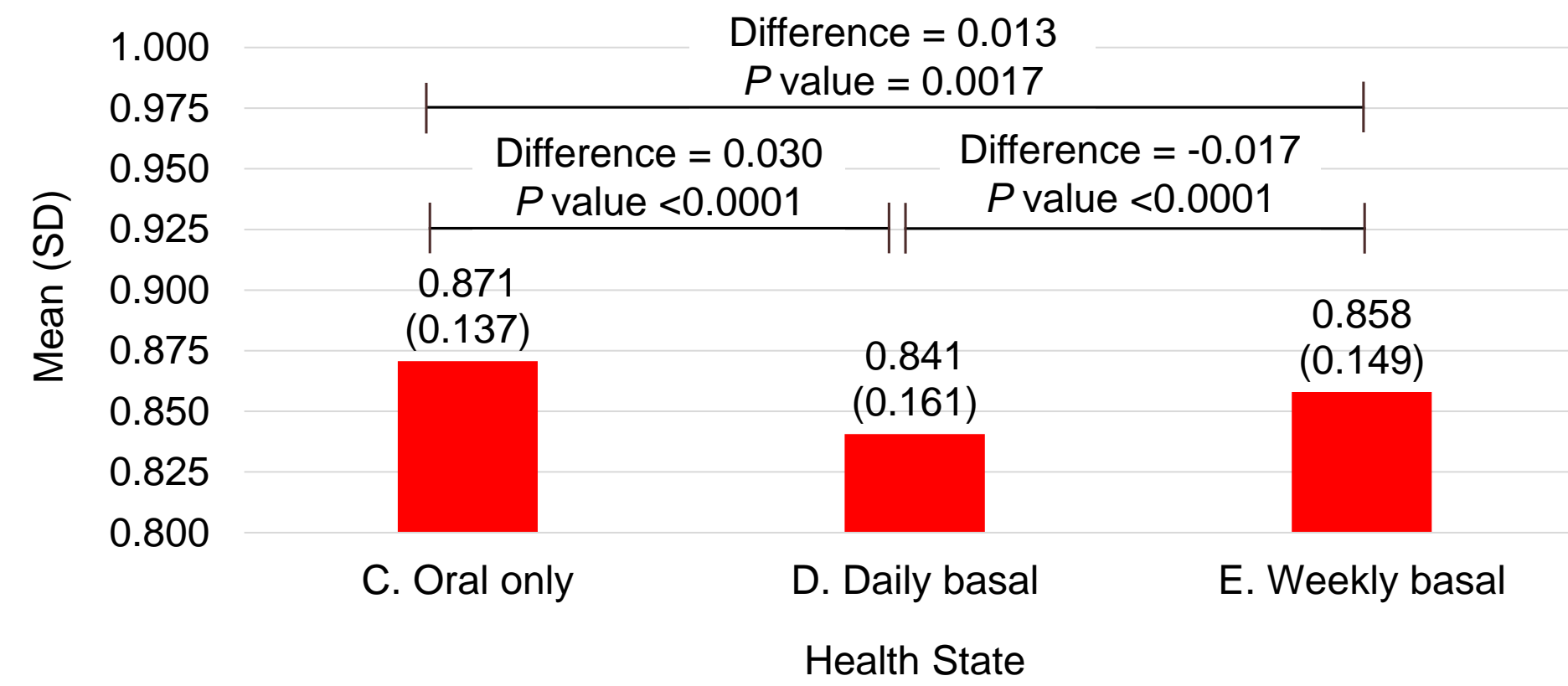
- Mean (SD) utilities are presented in **Figure 2a** and **Figure 2b**.
- Weekly insulin was associated with a greater mean utility than daily basal insulin among participants with T1D (mean utility difference = 0.005;  $P < 0.05$ ) and participants with T2D (mean utility difference = 0.017;  $P < 0.0001$ ).

**Figure 2a. Mean (SD) Utilities for T1D Health States**



Abbreviations: SD = standard deviation; T1D = type 1 diabetes

**Figure 2b. Mean (SD) Utilities for T2D Health States**



Abbreviations: SD = standard deviation; T2D = type 2 diabetes

## Limitations

- The vignette-based approach is commonly used to isolate the impact of treatment process on preference and utility.<sup>7</sup> However, a limitation of this approach is that the resulting utility scores represent preferences for the health state descriptions rather than the experience of patients who have used all these treatments. The extent to which these utilities might differ from preferences of patients using the treatments is not known.
- Data were collected in the UK. Generalizability of the resulting utilities to other regions is unknown.

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