1106-P

Predictors of Insulin Total Daily Dose (TDD) in US Adults with T2D on Multiple Daily Injections (MDI): Retrospective Observational Study

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Introduction

- Many individuals with T2D eventually require insulin to achieve glycemic goals[1]
- The usual progression of pharmacologic therapy for these individuals is the addition of basal insulin to noninsulin glucose-lowering agents, followed by a basal-prandial insulin regimen requiring multiple daily injections (MDI) of insulin[1-3]
- Factors affecting the total daily dose (TDD) of insulin for people with T2D on MDI are not well-defined

Objective

- To investigate demographic and clinical factors for their potential impact on TDD

Methods

Study design and eligibility criteria

- Retrospective observational study using a deidentified clinical database
- Data source: the IQVIA ambulatory electronic medical record database
  - At the time of the study, the database included ~87 million patient records from throughout the US
- Eligibility: Age ≥18 years old with T2D and initiating MDI from January 1, 2017, to July 1, 2022
  - Exclusion criteria: Diagnosis of T1D or receiving U-500 insulin or premixed insulin

MDI and TDD determination

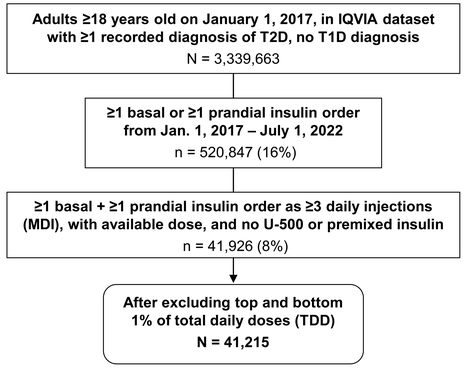
- MDI initiation ("index date") was defined as the first recorded episode of ≥3 daily injections of a basal-prandial insulin regimen
- Mean TDD per person was determined for the post-index period until the last recorded prescription during the study period ending July 1, 2022

Statistical analyses

- **Summary statistics:** used to describe TDD for the overall study population for the post-index period
- **Generalized linear model (GLM) regression analysis:** used to investigate impact of demographic characteristics and diabetes medications (other than insulin) on TDD
  - Predictor variables were selected based on clinical relevance, including sex, age category, race, US Census Region, body mass index (BMI), concomitant medication type, and number of concomitant noninsulin medications
  - Natural logarithm of TDD, log(TDD), was used to normalize the data, given that TDD was right skewed

Results

Figure 1. Identification of 41,215 people with T2D using MDI



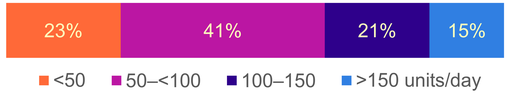
Study population

- Overall mean (SD) age was 58 (13) years; and 13,837 people (34%) were ≥65 years old
- 21,481 people (52%) were women
- Mean (SD) BMI was 34.1 (6.7) kg/m^2

Total daily dose of insulin

- Overall TDD (N = 41,215):
  - Mean (±SD): 96 (±58) units
  - Median: 80 units (interquartile range, 54–124u); range, 19 – 340u

Figure 2. Total daily dose of insulin categorized (N = 41,215)



The mean total daily dose of insulin in the study population with T2D using MDI was 96 units, and 36% of people used a mean total daily dose of 100u or more.

Generalized linear model regression

- 26,194 people with complete information were included in the regression analyses

Table 1. Generalized linear model regression results[a]

	Incident rate ratio[b]	t-value[c]	p-value
Variables associated with lower log(TDD)			
Female (ref: male)	0.93[a]	-10.89	<0.001
Race (ref: White)			
African American	0.85	-15.69	<0.001
Other	0.98	-1.86	0.063
Region (ref: South)			
Northeast	0.87	-13.53	<0.001
West	0.92	-9.30	<0.001
Midwest	0.92	-8.42	<0.001
Pre-index sulfonylurea ([SU] ref: no SU)	0.94	-2.74	0.006
Pre-index metformin (ref: no metformin)	0.95	-3.04	0.002
Pre-index no. additional diabetes meds (ref: 0)			
1	0.98	-1.48	0.14
2	0.92	-2.19	0.028
3	0.80	-2.11	0.035
Variables associated with greater log(TDD)			
Age (ref: ≥65 years)			
18-29 years	0.98	-0.97	0.33
30-49 years	1.07	6.70	<0.001
50-64 years	1.12	14.77	<0.001
BMI (for every 1 kg/m^2 increase)	1.03	56.95	<0.001
Pre-index GLP-1 RA (ref: no GLP-1 RA)	1.12	5.99	<0.001
Pre-index SGLT2-I (ref: no SGLT2-I)	1.08	3.67	<0.001

[a] The model p-value was <0.0001, indicating that the model fit is statistically significant at a 5% level of significance. The coefficient of multiple determination R^2 was 0.14, indicating that the model accounts for 14% of variation in log(TDD).
[b] The incident rate ratio (IRR) value can be interpreted as the percentage difference from the reference variable (with value of 1.0), eg, IRR of 0.93 for women indicates 7% lower TDD, on average, than for men.
[c] Higher absolute t-values indicate stronger evidence of relationship between dependent and independent variables.
GLP-1 RA, glucagon-like peptide 1 receptor agonist; no., number; ref, reference variable or category; meds, noninsulin medications; SGLT2-I, sodium-glucose cotransporter 2 inhibitor.

Study limitations

- We were limited to the demographic and clinical variables available in the database; thus, additional research is warranted to explore other potentially relevant predictors
- As for all retrospective studies, findings may be limited by missing or mis-recorded data

Key Findings

- On average, **TDD was lower by:**
  - ✓ **7%** among women than men
  - ✓ **15%** among African American than among White individuals
  - ✓ **2%, 8%, and 20%** among those using **1, 2, or 3 noninsulin medications** before the index date, respectively, versus 0 prior noninsulin medications
- On average, **TDD was greater by:**
  - ✓ **7%** for ages 30–49 years, and **12%** for ages 50–64 years, versus age 65 and older
  - ✓ **3%** for each unit increase in BMI
  - ✓ **8%** among those using an SGLT2 inhibitor pre-index date versus no SGLT2 inhibitor
  - ✓ **12%** among those using a GLP-1 RA pre-index date versus no GLP-1 RA

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Abbreviations

BMI, body mass index
GLP-1 RA, glucagon-like peptide 1 receptor agonist
IRR, incident rate ratio
MDI, multiple daily injections of insulin
Ref, reference variable or category
SGLT2, sodium-glucose cotransporter 2
TDD, total daily dose of insulin
u, units of insulin

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embecta, formerly part of BD.

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