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Research Article

Real-world Analysis of Clinical Characteristics and Treatment Patterns in Patients with Type 2 Diabetes in the United Arab Emirates

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Abstract

Introduction: This real-world study examined the demographics, clinical characteristics, and treatment of patients with type 2 diabetes mellitus (T2DM) in routine clinical practice in the UAE.

Methods: Data were drawn from the Adelphi Real World Diabetes Disease Specific Programme (DSP)™, a cross-sectional survey of physicians and their patients with T2DM in the UAE from July to October 2022. Patient data were divided into four stratification factors: physician care, HbA1c level, obesity status, and age, with factors then divided into subgroups.

Results: Seventy physicians provided data for 849 patients (mean [SD] age 46.4 [10.6] years, with 31.1% of patients ≤40 years of age; 56.8% male; BMI 28.5 [4.4] kg/m^2, with 27.3% of patients having a BMI ≥30 kg/m^2). The mean HbA1c was 9.0% [1.1%] at diagnosis, 8.8% [1.1%] at the start of current treatment, and 7.5% [0.9%] at the last follow-up visit. Younger age, lower BMI, and shorter time since diagnosis were associated with a lower most recent HbA1c result (each $p<0.0001$). Overall, 84.5% of patients did not achieve the HbA1c target set by the physician post-treatment. The mean number of treatments was 1.3, and most patients (73%) only received one line of treatment. It took 3.3 years to switch patients from their previous to current therapy; only 59.7% of patients switched because of inadequate HbA1c reduction.

Conclusion: Despite receiving prescribed antidiabetic treatment, a high proportion of patients in our survey did not reach their target HbA1c. High HbA1c was correlated with age, time since diagnosis, and BMI, indicating a need for more efficacious treatment, particularly for older and high-BMI patients. Use of more optimal treatments may improve glycemic control and outcomes in this patient population.

Keywords: United Arab Emirates, type 2 diabetes, observational study, clinical characteristics, treatment

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1. Introduction

Worldwide, the United Arab Emirates (UAE) has one of the highest prevalence rates of type 2 diabetes mellitus (T2DM), estimated to be 12.3% of adults aged 20–79 years in 2021 [1], and projected to reach 21.6% by 2030 [2]. The age-adjusted prevalence of impaired glucose tolerance among adults aged 20–79 years was 18.3% in 2021 [1].

T2DM without proper glycemic control can cause microvascular and macrovascular complications, including diabetic nephropathy, retinopathy, and neuropathy, leading to significant morbidity and mortality [3]. T2DM confers approximately a twofold excess risk of cardiovascular disease (CVD) [4], which affects an estimated 32.2% of all people with T2DM [5]. T2DM also confers approximately a threefold risk of chronic kidney disease (CKD) [6], with estimates suggesting that 37% of patients with T2DM also have CKD [7]. American and European guidelines recommend a glycated hemoglobin (HbA1c) target of <7.0% (<53 mmol/mol) for most nonpregnant adults [3, 8, 9]. This level of glycemic control can reduce the risk of microvascular complications [10], with further risk reductions over time [11]. Studies have also shown the importance of early glucose control and the consequences of failing to achieve near-normal glycemia soon after patients are diagnosed [11–13]. In line with the latest American and European T2DM guidelines, the UAE T2DM guidelines recommend establishing individualized HbA1c targets, personalized to each patient with T2DM [3, 9, 14]. Additionally, these guidelines recommend pharmacotherapy based on cardiovascular (CV), CKD, weight, and hypoglycemia risks [14].

First-line therapy for glycemic control is generally considered to be metformin monotherapy [14]. However, due to the progressive nature of the disease, the efficacy of monotherapy decreases, resulting in uncontrolled glycemia [14]. Other anti-hyperglycemic agents (AHAs) with or without metformin are recommended as initial therapy for patients with, or at high risk for, atherosclerotic CVD, heart failure, and/or CKD [8, 9]. For these high-risk patients, treatment intensification may be required using personalized AHA combination regimens to achieve effective glycemic control, with the advantages of each treatment providing complementary outcomes benefits [15]. However, therapeutic inertia, whereby therapy is not intensified or is withheld [16], and suboptimal glycemic control has been shown in many patients with diabetes [17].

An Abu Dhabi UAE population-wide CV screening program reported that 29.5% of the population had pre-diabetes and 24.6% had diabetes, and that T2DM risk factor prevalence for, with rates of dyslipidemia, obesity, overweight, and hypertension were 44.2%, 35.4%, 31.9%, and 23.1% [18]. In patients with T2DM attending UAE hospital clinics, high HbA1c and high fasting glucose levels were reported in 36.7% and 50.4% of presenting patients respectively [19]. The majority (80.5%) of patients with T2DM experienced one or more diabetes-associated complications, with microvascular complications reported in 20.4% and macrovascular complications in 10.2% [19]. These patients commonly had dyslipidemia (93.4%), obesity (90.5%), hypertension (83.4%), and a suboptimal glomerular filtration rate (<90 mL/min/1.73m2; 53.6%)

[19]. Another study showed that these conditions are already present in young Emirati men, with rates of 41.3% for impaired fasting glucose and 4.7% for diabetes [20]. This was recognized by the local guidelines, which suggested that the screening in UAE should start earlier, at the age of 30 years [14].

Despite the well-documented prevalence of diabetes in the UAE, literature describing the current UAE T2DM population and prescribed treatments is generally limited. UAE guidelines [14] reference the high prevalence of comorbidities and acknowledge that there are gaps between the current understanding of T2DM and clinical practices in the UAE [14]. This study aimed to collect real-world data on the demographic and clinical characteristics of patients with T2DM in the UAE and evaluate treatment patterns in routine clinical practice.

2. Methods

2.1. Survey Design

Data were drawn from the Adelphi Real World Diabetes Disease Specific Programme, a cross-sectional survey, with elements of retrospective data collection, of physicians and their consulting patients with T2DM, conducted in the UAE from July to October 2022. The DSP methodology has been published and validated [21, 22].

2.2. Participant Population

Physicians completed electronic patient record forms for the next 12 consecutively consulting patients with T2DM who met the patient eligibility criteria. Physicians (primary care physicians [PCPs], internists, diabetologists, endocrinologists, cardiologists, and nephrologists) were eligible to participate in the survey if they were personally responsible for managing and making treatment decisions for patients with T2DM. PCPs, internal medicine specialists, cardiologists, and nephrologists had to have a clinical workload of >25 patients with T2DM in a typical month, and diabetologists and endocrinologists had to have a clinical workload of >50 patients with T2DM in a typical month.

Patients were eligible for inclusion if they were 18 years of age or older, had a physician-confirmed diagnosis of T2DM, and were currently taking at least one antidiabetic medication, including an oral and/or a glucagon-like peptide-1 receptor agonist (GLP-1 RA) and/or insulin. Patients who were involved in a clinical trial at the time of the study were excluded.

2.3. Participant Selection and Data Collection

Physicians were recruited by a local third-party agency based on publicly available data across the UAE. A geographically diverse sample of physicians who met the inclusion criteria and agreed to participate

in the study was included. Following completion of a screener questionnaire, physicians were requested to complete electronic patient record forms for their next 12 consecutively consulting eligible patients.

Record forms were completed using data extracted from patient medical records, as well as the judgment and diagnostic skills of the clinicians, consistent with decisions made in routine clinical practice. The patient record form contained questions on patient demographics, clinical characteristics, treatment history, and reasons for treatment choice.

2.4. Outcome Measures

Physicians-reported demographic data included age, biological sex, and ethnicity. Clinical measures included body mass index (BMI), time since diagnosis, percentage HbA1c at diagnosis, most recently recorded percentage HbA1c in the 12 months prior to survey, target HbA1c percentage, presence of CKD and time since CKS diagnosis, and the type and number of comorbidities.

To assess risk of another CV event and risk of renal impairment, for their consulting patients, physicians answered the questions "*What level of risk do you consider this patient has of having <a/another> cardiovascular event?*" and "*How would you assess the potential risk of this patient to develop renal impairment within the next 2-3 years?*" Physicians assessed the patient to be at 'very low', 'low', 'moderate', 'high', or 'very high risk'. No criteria for assessing risk were provided to physicians, and physicians' subjective assessment of risk reflects routine clinical practice and judgment.

Physicians also reported the class of medication received by patients at the time of the survey.

2.5. Data Analysis

Patient data were stratified by the following factors: physician care, HbA1c level, obesity status, and age. The stratification factors were then divided into subgroups as follows:

(i) HbA1c level: <7%, ≥7%–<7.5%, ≥7.5%–<8%, and ≥8.0%;

(ii) Obesity status: patients without obesity (BMI <30kg/m^2) vs with obesity (BMI ≥30kg/m^2); and

(iii) Age in years: ≤40, 41–50, 51–60, 61–70, and >70.

For the HbA1c level stratification factor, the 'most recent HbA1c' was the most recent test result in the last 12 months. The 'target HbA1c' was the HbA1c level set by the physician for the patient.

For the obesity status stratification factor, patients were stratified by their BMI, whereby those with a BMI of <30 kg/m^2 were classified as having no obesity, and those with a BMI ≥30 kg/m^2 were classified as having obesity. Patients with a BMI between ≥25 and <30 kg/m^2 were classified as overweight.

Analyses were carried out across the subgroups within a stratification factor, and notable differences between the subgroups were highlighted.

Data were summarized using descriptive analyses. Means and standard deviations (SD) were calculated for continuous variables, and frequencies and percentages were calculated for categorical variables. Missing data were not imputed; therefore, the base of patients for analysis varies from variable to variable. Where patient numbers differed from the study sample due to missing data, the number of patients is reported for that group.

When comparing two groups, a student's *t*-test was conducted for continuous variables. For ordered categorical variables, the Mann–Whitney U test was used, and for nominal categorical variables, Fisher's exact test was used where possible, or the Chi-squared test otherwise. For comparisons of three or more groups, ANOVA was conducted for continuous variables, Kruskal–Wallis for ordered categorical variables, Fisher's exact test, where possible, or the Chi-squared test otherwise was used for nominal categorical variables. The *p*-value significance level was $p<0.05$. The risk of another CV event and the risk of renal impairment were ranked using the Mann–Whitney U test.

Correlations across the stratification factors were investigated. Correlations were made between the most recent HbA1c test results, age, BMI, and time since diagnosis (years) using Pearson's Rho. The most recent HbA1c test results referred to those carried out within the last 12 months, and all target HbA1c levels were determined and set for each patient by their physician.

All analyses were generated using the statistical software package STATA® Version 17 (StataCorp. 2021. College Station, TX: StataCorp LLC).

3. Results

3.1. Patient Demographics and Clinical Characteristics

3.1.1. General Characteristics

A total of 58 specialists and 17 PCPs provided data for 849 patients with T2DM, 24 physicians from Dubai, 17 from Abu Dhabi, 14 from Sharjah, and 20 from the remaining emirates.

Treatment decisions were made by diabetologists/endocrinologists, PCPs, internal medicine specialists, cardiologists, and nephrologists for 45.9%, 23.8%, 22.3%, 7.0%, and 7.0% of patients, respectively. Physicians saw 64.7% of their patients in a private setting and 33.9% in a public setting.

Overall, at the point of data collection, patients had a mean age of 46.4 [10.6] years, 56.8% were male, 34.2% were Middle Eastern Arabs, 26.6% were Emiratis, and 21.0% were people from the Asian-Indian subcontinent. Most patients were ≤60 years of age, with 31.1% of patients being ≤40 years of age. The mean BMI of patients was 28.5 [4.4] kg/m^2. The proportion of patients classified as normal weight, overweight, and obese was 20.2%, 52.2%, and 27.5%, respectively.

The majority of patients had insurance coverage (90.3%), with voluntary private health insurance being the most common type (49.1%), followed closely by Damen coverage (41.2%).

3.1.1.1. Split by HbA1c Level

There was a significant difference in patients' age ($p<0.0001$) and sex ($p=0.0346$) across different HbA1c stratification groups. The mean BMI of patients was significantly different between HbA1c level groups, ranging from 27.7 [4.4] kg/m^2 in the <7% subgroup to 29.4 [5.2] kg/m^2 in the ≥8.0% subgroup ($p=0.0015$; Table **1**).

Table 1: Physician-reported characteristics of patients with type 2 diabetes in the United Arab Emirates: HbA1c level category.

HbA1c groups	Overall *n*=832	<7% *n*=198	≥7%–<7.5% *n*=171	≥7.5%–<8% *n*=272	≥8.0% *n*=191	*p* value (test)
BMI, *n*	818	197	171	272	178	
kg/m^2, mean [SD]	28.5 [4.5]	27.7 [4.4]	28.2 [3.8]	28.6 [4.3]	29.4 [5.2]	0.0015 (AN)
Normal weight, *n* (%)	166 (20.3)	57 (28.9)	29 (17.0)	52 (19.1)	28 (15.7)	0.0014 (KW)
Overweight, *n* (%)	426 (52.1)	99 (50.3)	97 (56.7)	142 (52.2)	88 (49.4)	
Obese, *n* (%)	209 (25.6)	38 (19.3)	43 (25.2)	72 (26.5)	56 (31.5)	
Severely obese, *n* (%)	17 (2.1)	3 (1.5)	2 (1.2)	6 (2.2)	6 (3.4)	
Time since diabetes diagnosis, years	816	193	167	271	185	
years, mean [SD]	5.8 [5.1]	4.8 [4.6]	6.1 [4.9]	5.9 [4.3]	6.4 [6.7]	0.0111 (AN)
HbA1c at start of current treatment regimen, *n*	831	198	171	272	190	
%, mean [SD]	8.8 [1.1]	8.6 [1.2]	8.8 [1.2]	8.7 [0.7]	9.3 [1.3]	<0.0001 (AN)
Most recent HbA1c (%) in the last 12 months, *n*	832	198	171	272	191	
%, mean [SD]	7.5 [0.9]	6.5 [0.4]	7.2 [0.2]	7.7 [0.1]	8.7 [0.9]	<0.0001 (AN)
<7%, *n* (%)	198 (23.8)	198 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	<0.0001 (KW)
7%–≤7.5%, *n* (%)	171 (20.6)	0 (0.0)	171 (100.0)	0 (0.0)	0 (0.0)	
7.5%–≤8%, *n* (%)	272 (32.7)	0 (0.0)	0 (0.0)	272 (100.0)	0 (0.0)	
≥8%, *n* (%)	191 (23.0)	0 (0.0)	0 (0.0)	0 (0.0)	191 (100.0)	
Target HbA1c, *n*	825	198	169	272	186	
%, mean [SD]	6.7 [2.3]	6.3 [0.5]	6.5 [0.4]	6.8 [0.4]	7.1 [4.8]	0.0029 (AN)
<7%, *n* (%)	568 (68.9)	177 (89.4)	130 (76.9)	157 (57.7)	104 (55.9)	<0.0001 (KW)
7%–≤7.5%, *n* (%)	208 (25.2)	19 (9.6)	36 (21.3)	89 (32.7)	64 (34.4)	
7.5%–≤8%, *n* (%)	40 (4.9)	2 (1.0)	3 (1.8)	26 (9.6)	9 (4.8)	
≥8%, *n* (%)	9 (1.1)	0 (0.0)	0 (0.0)	0 (0.0)	9 (4.8)	
HbA1c change from diagnosis to most recent (in the last 12 months), *n*	791	187	164	270	170	
% change mean [SD]	–15.5 [12.0]	–25.2 [10.3]	–19.9 [11.1]	–11.6 [6.5]	–6.7 [12.0]	<0.0001 (AN)

Table 1: Continued.

HbA1c groups	Overall *n*=832	<7% *n*=198	≥7%–<7.5% *n*=171	≥7.5%–<8% *n*=272	≥8.0% *n*=191	*p* value (test)
Negative change, *n* (%)	732 (92.5)	184 (98.4)	159 (97.0)	269 (99.6)	120 (70.6)	
No change, *n* (%)	25 (3.2)	2 (1.1)	2 (1.2)	0 (0.0)	21 (12.4)	<0.0001 (KW)
Positive change, *n* (%)	34 (4.3)	1 (0.5)	3 (1.8)	1 (0.4)	29 (17.1)	
CKD status, *n*	831	198	171	272	190	
CKD, *n* (%)	135 (16.3)	30 (15.2)	26 (15.2)	38 (14.0)	41 (21.6)	0.1500 (CH)
Time since CKD diagnosis, *n*	127	27	26	38	36	
Yrs, mean [SD]	3.6 [2.1]	4.0 [2.4]	3.8 [2.1]	3.5 [1.7]	3.3 [2.4]	0.5928 (AN)
Comorbidities, *n*	832	198	171	272	191	
Hypertension	393 (47.2)	63 (31.8)	74 (43.3)	150 (55.2)	106 (55.5)	<0.0001 (FE)
Dyslipidemia	187 (22.5)	54 (27.3)	37 (21.6)	44 (16.2)	52 (27.2)	0.0100 (FE)
Renal disease	109 (13.1)	19 (9.6)	23 (13.5)	35 (12.9)	32 (16.8)	0.2208 (FE)
Number of comorbidities, *n*	832	198	171	272	191	
Mean [SD]	1.8 [1.7]	1.7 [1.8]	1.6 [1.5]	1.5 [1.3]	2.4 [2.1]	<0.0001 (AN)
Risk of another CV even, *n*	832	198	171	272	191	
Very low risk, *n* (%)	111 (13.3)	40 (20.2)	22 (12.9)	2 (4.4)	37 (19.4)	
Low risk, *n* (%)	362 (43.5)	78 (39.4)	70 (40.9)	149 (54.8)	65 (34.0)	
Moderate risk, *n* (%)	277 (33.3)	59 (29.8)	59 (34.5)	98 (36.0)	61 (31.9)	0.3609 (KW)
High risk, *n* (%)	65 (7.8)	19 (9.6)	15 (8.8)	11 (4.0)	20 (10.5)	
Very high risk, *n* (%)	17 (2.0)	2 (1.0)	5 (2.9)	2 (0.7)	8 (4.2)	
Risk of renal impairment in the next 2–3 years, *n*	697	168	145	234	150	
Very low risk, *n* (%)	121 (17.4)	46 (27.4)	22 (15.2)	12 (5.1)	41 (27.3)	
Low risk, *n* (%)	322 (46.2)	87 (51.8)	74 (51.0)	114 (48.7)	47 (31.3)	
Moderate risk, *n* (%)	219 (31.4)	32 (19.1)	40 (27.6)	102 (43.6)	45 (30.0)	
High risk, *n* (%)	31 (4.5)	3 (1.8)	7 (4.8)	6 (2.6)	15 (10.0)	<0.0001 (KW)
Very high risk, *n* (%)	4 (0.6)	0 (0.0)	2 (1.4)	0 (0.0)	2 (1.3)	
Insurance coverage	788	186	157	268	177	
Daman, *n* (%)	325 (41.2)	57 (30.7)	61 (38.9)	137 (51.1)	70 (39.6)	
Voluntary private health, *n* (%)	387 (49.1)	104 (55.9)	80 (51.0)	122 (45.5)	81 (45.8)	<0.0001 (CH)
No insurance coverage, *n* (%)	76 (9.6)	25 (13.4)	16 (10.2)	9 (3.4)	26 (14.7)	

AN, analysis of variance; BMI, body mass index; CH, Chi square test; CKD, chronic kidney disease; CV, cardiovascular; FE, Fisher's exact test; HbA1c, glycated hemoglobin; KW, Kruskal-Wallis test; SD, standard deviation; TZD, thiazolidinedione. Proportions may not equal 100% due to rounding.

3.1.1.2. Split by Obesity Status

Patients without obesity were significantly younger than patients with obesity (mean age was 45.8 [10.5] years vs 47.4 [9.9] years, respectively, p=0.0394), and had received their diagnosis more recently (5.3 [4.9] years vs 6.7 [5.4] years, p=0.0007; Table **2**).

Table 2: Physician-reported demographics and clinical characteristics of patients with type 2 diabetes in the United Arab Emirates stratified by obesity level.

	Overall *n*=835	**Without obesity *n*=605**	**With obesity *n*=230**	***p* value (test)**
BMI, *n*	835	605	230	
kg/m^2, mean [SD]	28.5 [4.4]	26.4 [1.9]	34.0 [4.3]	<0.0001 (TT)
Normal weight, *n* (%)	169 (20.2)	169 (27.9)	0 (0.0)	<0.0001 (MW)
Overweight, *n* (%)	436 (52.2)	436 (72.1)	0 (0.0)	
Obese, *n* (%)	213 (25.5)	0 (0.0)	213 (92.6)	
Severely obese, *n* (%)	17 (2.0)	0 (0.0)	17 (7.4)	
Time since diabetes diagnosis, *n*	817	601	216	
Years, mean [SD]	5.7 [5.0]	5.3 [4.9]	6.7 [5.4]	0.0007 (TT)
HbA1c at start of current treatment regimen, *n*	834	605	229	
%, mean [SD]	8.8 [1.1]	8.8 [1.0]	8.9 [1.4]	0.1206 (TT)
Most recent HbA1c in the last 12 months, *n*	818	592	226	
%, mean [SD]	7.5 [0.9]	7.5 [0.8]	7.7 [1.1]	0.0034 (TT)
<7%, *n* (%)	197 (24.1)	156 (26.4)	41 (18.1)	0.0025 (MW)
7%–≤7.5%, *n* (%)	171 (20.9)	126 (21.3)	45 (19.9)	
7.5%–≤8%, *n* (%)	272 (33.3)	194 (32.8)	78 (34.5)	
≥8%, *n* (%)	178 (21.8)	116 (19.6)	62 (27.4)	
Target HbA1c, *n*	823	595	228	
%, mean [SD]	6.7 [2.3]	6.7 [2.7]	6.7 [0.5]	0.7656 (TT)
<7%	572 (69.5)	430 (72.3)	142 (62.3)	0.0052 (MW)
7%–≤7.5%	203 (24.7)	134 (22.5)	69 (30.3)	
7.5%–≤8%	40 (4.9)	27 (4.5)	13 (5.7)	
≥8%	8 (1.0)	4 (0.7)	4 (1.8)	
HbA1c change from diagnosis to most recent (in the last 12 months), *n*	782	574	208	
%, mean [SD]	–15.6 [12.0]	–15.6 [12.1]	–15.6 [11.8]	0.9619 (TT)
Negative change	726 (92.8)	533 (92.9)	193 (92.8)	0.985 (MW)
No change	25 (3.2)	16 (2.8)	9 (4.3)	
Positive change	31 (4.0)	25 (4.4)	6 (2.9)	
CKD status, *n*	832	604	228	

Table 2: Continued.

	Overall *n*=835	**Without obesity *n*=605**	**With obesity *n*=230**	***p* value (test)**
CKD, *n* (%)	134 (16.1)	99 (16.4)	35 (15.4)	0.7521 (FE)
Time since CKD diagnosis, *n*	126	94	32	
Years, mean [SD]	3.6 [2.1]	3.5 [2.0]	3.9 [2.5]	0.2616 (TT)
Comorbidities, *n*	835	605	230	
Hypertension	389 (46.6)	255 (42.2)	134 (58.3)	<0.0001 (FE)
Dyslipidemia	189 (22.6)	120 (19.8)	69 (30.0)	0.0022 (FE)
Renal disease	108 (12.9)	77 (12.7)	31 (13.5)	0.8175 (FE)
Number of comorbid conditions, *n*	835	605	230	
Mean [SD]	1.74 [1.66]	1.5 [1.3]	2.4 [2.2]	<0.0001 (TT)
Risk of another CV event, *n*	835	605	230	
Very low risk, *n* (%)	106 (12.7)	82 (13.6)	24 (10.4)	<0.0001 (MW)
Low risk, *n* (%)	363 (43.5)	301 (49.8)	62 (27.0)	
Moderate risk, *n* (%)	284 (34.0)	191 (31.6)	93 (40.4)	
High risk, *n* (%)	65 (7.8)	22 (3.6)	43 (18.7)	
Very high risk, *n* (%)	17 (2.0)	9 (1.5)	8 (3.5)	
Risk of renal impairment in the next 2–3 years, *n*	701	506	195	
Very low risk, *n* (%)	118 (16.8)	87 (17.2)	31 (15.9)	<0.0001 (MW)
Low risk, *n* (%)	325 (46.4)	265 (52.4)	60 (30.8)	
Moderate risk, *n* (%)	223 (31.8)	138 (27.3)	85 (43.6)	
High risk, *n* (%)	31 (4.4)	12 (2.4)	19 (9.7)	
Very high risk, *n* (%)	4 (0.6)	4 (0.8)	0 (0.0)	
Insurance coverage	791	579	212	
Daman, *n* (%)	326 (41.2)	237 (40.9)	89 (42.0)	0.9499 (FE)
Voluntary private health, *n* (%)	390 (49.3)	286 (49.4)	104 (49.1)	
No insurance coverage, *n* (%)	75 (9.5)	56 (9.7)	19 (9.0)	

BMI, body mass index; CH, Chi square test; CKD, chronic kidney disease; CV, cardiovascular; FE, Fisher's Exact test; HbA1c, glycated hemoglobin; MW, Mann-Whitney U test; SD, standard deviation; T2DM, type 2 diabetes mellitus; TT, *t*-test. Proportions may not equal 100% due to rounding.

3.1.1.3. Split by Age

The duration of T2DM was significantly different between age groups, ranging from 3.1 [2.5] years to 13.4 [10.3] years, $p<0.0001$ (Table **3**).

Table 3: Physician-reported characteristics of patients with type 2 diabetes in the United Arab Emirates stratified by age.

	Overall *n*=849	**≤40 years *n*=264**	**41–50 years *n*=276**	**51–60 years *n*=241**	**61–70 years *n*=50**	**>70 years *n*=18**	***p* value (test)**
BMI, *n*	835	263	271	238	49	14	
Kg/m^2, mean [SD]	28.5 [4.4]	27.9 [4.1]	28.6 [4.5]	28.8 [4.8]	28.6 [3.9]	30.0 [4.5]	0.1200 (AN)
Normal weight	169 (20.2)	60 (22.8)	50 (18.5)	49 (20.6)	8 (16.3)	2 (14.3)	0.463 (KW)
Overweight	436 (52.2)	139 (52.9)	146 (53.9)	118 (49.6)	27 (55.1)	6 (42.9)	
Obese	213 (25.5)	58 (22.1)	67 (24.7)	69 (29.0)	13 (26.5)	6 (42.9)	
Severely obese	17 (2.0)	6 (2.3)	8 (3.0)	2 (0.8)	1 (2.0)	0 (0.0)	
Time since diabetes diagnosis, years	831	263	271	232	50	15	
Years, mean [SD]	5.7 [5.1]	3.1 [2.5]	5.3 [3.8]	8.0 [5.5]	9.2 [8.0]	13.4 [10.3]	<0.0001 (AN)
HbA1c at start of current treatment regimen, *n*	848	264	276	241	50	17	
%, mean [SD]	8.8 [1.1]	8.7 [1.0]	8.8 [1.0]	8.9 [1.3]	8.9 [1.3]	10.5 [1.1]	<0.0001 (AN)
Most recent HbA1c in the last 12 months, *n*	832	256	272	236	50	18	
%, mean [SD]	7.5 [0.9]	7.4 [0.8]	7.5 [0.8]	7.6 [1.0]	7.7 [0.9]	8.9 [1.4]	<0.0001 (AN)
<7%	198 (23.8)	67 (26.2)	72 (26.5)	51 (21.6)	7 (14.0)	1 (5.6)	0.0005 (KW)
7%–≤7.5%	171 (20.6)	50 (19.5)	57 (21.0)	49 (20.8)	12 (24.0)	3 (16.7)	
7.5%–≤8%	272 (32.7)	90 (35.2)	84 (30.9)	86 (36.4)	11 (22.0)	1 (5.6)	
≥8%	191 (23.0)	49 (19.1)	59 (21.7)	50 (21.2)	20 (40.0)	13 (72.2)	
Target HbA1c, *n*	836	258	271	239	50	18	
%, mean [SD]	6.7 [2.3]	6.4 [0.4]	6.6 [0.5]	6.8 [0.6]	6.6 [0.7]	10.5 [15.4]	<0.0001 (AN)
<7%	578 (69.1)	235 (91.1)	185 (68.3)	122 (51.1)	29 (58.0)	7 (38.9)	<0.0001 (KW)
7%–≤7.5%	209 (25.0)	20 (7.8)	80 (29.5)	86 (36.0)	16 (32.0)	7 (38.9)	
7.5%–≤8%	40 (4.8)	2 (0.8)	4 (1.5)	28 (11.7)	5 (10.0)	1 (5.6)	
≥8%	9 (1.1)	1 (0.4)	2 (0.7)	3 (1.3)	0 (0.0)	3 (16.7)	
HbA1c change from diagnosis to most recent (in the last 12 months), *n*	791	253	255	232	43	8	
%, mean [SD]	–15.5 [12.0]	–14.7 [10.5]	–15.9 [11.7]	–15.7 [13.6]	–17.4 [12.9]	–12.0 [16.6]	0.5474 (AN)
Negative change, *n* (%)	732 (92.5)	240 (94.9)	234 (91.8)	211 (91.0)	41 (95.4)	6 (75.0)	0.1112 (KW)
No change, *n* (%)	25 (3.2)	7 (2.8)	8 (3.1)	9 (3.9)	1 (2.3)	0 (0.0)	
Positive change, *n* (%)	34 (4.3)	6 (2.4)	13 (5.1)	12 (5.2)	1 (2.3)	2 (25.0)	
CKD status, *n*	846	262	276	240	50	18	
CKD, *n* (%)	136 (16.1)	32 (12.2)	50 (18.1)	39 (16.3)	8 (16.0)	7 (38.9)	0.0302 (CH)
Time since CKD diagnosis, *n*	128	32	50	34	6	6	

Table 3: Continued.

	Overall *n*=849	**≤40 years *n*=264**	**41–50 years *n*=276**	**51–60 years *n*=241**	**61–70 years *n*=50**	**>70 years *n*=18**	***p* value (test)**
Years, mean [SD]	3.6 [2.1]	2.9 [1.4]	3.3 [1.8]	4.1 [2.5]	4.6 [3.7]	6.1 [1.9]	0.0020 (AN)
Comorbidities, *n*	849	264	276	241	50	18	
Hypertension, *n* (%)	398 (46.9)	96 (36.4)	122 (44.2)	134 (55.6)	30 (60.0)	16 (88.9)	<0.0001 (FE)
Dyslipidemia, *n* (%)	193 (22.7)	29 (11.0)	62 (22.5)	73 (30.3)	19 (38.0)	10 (55.6)	<0.0001 (FE)
Renal disease, *n* (%)	110 (13.0)	32 (12.1)	33 (12.0)	29 (12.0)	10 (20.0)	6 (33.3)	0.0515 (FE)
Number of comorbid conditions, *n*	849	264	276	241	50	18	
Mean [SD]	1.8 [1.7]	1.3 [1.0]	1.6 [1.6]	2.0 [1.6]	3.0 [2.8]	4.5 [3.0]	<0.0001 (AN)
Risk of another CV event, *n*	849	264	276	241	50	18	
Very low risk, *n* (%)	114 (13.4)	36 (13.6)	47 (17.0)	24 (10.0)	4 (8.0)	3 (16.7)	
Low risk, *n* (%)	366 (43.1)	150 (56.8)	119 (43.1)	79 (32.8)	14 (28.0)	4 (22.2)	
Moderate risk, *n* (%)	286 (33.7)	71 (26.89)	82 (29.7)	108 (44.8)	20 (40.0)	5 (27.8)	<0.0001 (KW)
High risk, *n* (%)	66 (7.8)	7 (2.65)	26 (9.4)	21 (8.7)	7 (14.0)	5 (27.8)	
Very high risk, *n* (%)	17 (2.0)	0 (0.0)	2 (0.7)	9 (3.7)	5 (10.0)	1 (5.6)	
Risk of renal impairment in the next 2–3 years, *n*	713	232	226	202	42	11	<0.0001 (KW)
Very low risk, *n* (%)	126 (17.7)	43 (18.5)	53 (23.5)	19 (9.4)	7 (16.7)	4 (36.4)	
Low risk, *n* (%)	326 (45.7)	129 (55.6)	93 (41.2)	85 (42.1)	15 (35.7)	4 (36.4)	
Moderate risk, *n* (%)	226 (31.7)	53 (22.8)	72 (31.9)	83 (41.1)	15 (35.7)	3 (27.3)	
High risk, *n* (%)	31 (4.4)	7 (3.0)	8 (3.5)	11 (5.5)	5 (11.9)	0 (0.0)	
Very high risk, *n* (%)	4 (0.6)	0 (0.0)	0 (0.0)	4 (2.0)	0 (0.0)	0 (0.0)	
Insurance coverage	713	232	226	202	42	11	<0.0001 (KW)
Daman, *n* (%)	126 (17.7)	43 (18.5)	53 (23.5)	19 (9.4)	7 (16.7)	4 (36.4)	
Voluntary private health, *n* (%)	326 (45.7)	129 (55.6)	93 (41.2)	85 (42.1)	15 (35.7)	4 (36.4)	
No insurance coverage, *n* (%)	226 (31.7)	53 (22.8)	72 (31.9)	83 (41.1)	15 (35.7)	3 (27.3)	

AN, analysis of variance; BMI, body mass index; CH, Chi square test; CKD, chronic kidney disease; CV, cardiovascular; HbA1c, glycated hemoglobin; KW, Kruskal–Wallis test; SD, standard deviation.
Proportions may not equal 100% due to rounding.

3.1.2. HbA1c Management

The mean HbA1c at the start of the current treatment regimen was 8.8% [1.1%]. At diagnosis, patients' mean [SD] HbA1c was 9.0% [1.1%] while the result at last follow-up visit was 7.5% [0.9%]. At the point of data collection, 87.8% of patients had one or more concomitant conditions. Hypertension was present in 46.9% of all patients, followed by dyslipidemia (22.7%) and CKD (16.1%). Overall, 43.5% of patients were perceived by their physicians as at least moderately at risk of another CV event. The proportion of patients viewed as at least moderately at risk of renal impairment in the next two to three years was 36.6%.

There were statistically significant positive correlations between the most recent HbA1c test result and age (p=0.1741, p<0.0001; Figure **1**a), BMI (p=0.1362, p<0.0001; Figure **1**b), and time since diagnosis (years; p=0.1380, p<0.0001; Figure **1**c).

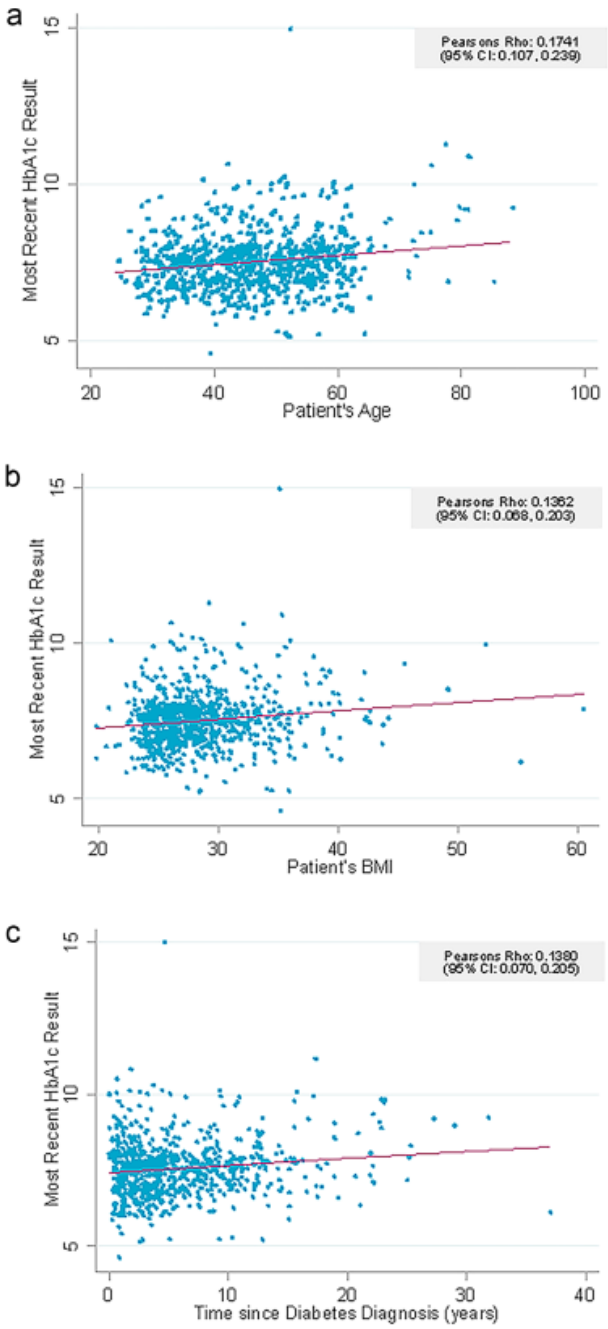

Figure 1: Correlations between the most recent HbA1c (%) test results (i.e., in the last 12 months) and (a) age, (b) BMI, and (c) time since diagnosis. BMI: body mass index.

3.1.2.1. Split by HbA1c Level

There was a significant difference in the change in HbA1c level from diagnosis to most recent, ranging from –25.2% [10.3%] for the HbA1c <7% group to –6.7% [12.0%] for the HbA1c ≥8.0% group (p<0.0001; Table **1**). The reduction of HbA1c was significantly different between HbA1c groups (p<0.0001), and the proportion of patients achieving this ranged from 70.6% to >95% in the lower HbA1c groups. HbA1c target set by physicians significantly differed across the HbA1c subgroups, ranging from 6.3% [0.5%] in the <7% subgroup to 7.1% [4.8%] in the ≥8.0% subgroup (p=0.0029). Hypertension, dyslipidemia, and CKD also differed across HbA1c levels (p<0.0001, p=0.0087, and p=0.1663, respectively). The risk of renal impairment in the next two to three years also significantly differed across the HbA1c groups (p<0.0001).

3.1.2.2. Split by Obesity Status

HbA1c targets were similar for patients without or with obesity (mean 6.7% [2.7%] vs 6.7% [0.5%], respectively); however, only a small proportion of patients achieved these targets (16.8% vs 13.2%, respectively, p=0.2399, Table **2**). Patients with obesity were more frequently diagnosed with hypertension than patients without obesity (58.3% vs 42.2%, p<0.0001), and dyslipidemia (30.0% vs 19.8%, p=0.0022), while CKD (15.4% vs 16.4%, p=0.7521) was similar between the subgroups. Renal impairment was significantly greater for patients with obesity compared to those without obesity (p<0.0001).

3.1.2.3. Split by Age

Patients aged ≤40, 41–50, 51– 60, 61–70, and >70 had an HbA1c at diagnosis of 8.8% [1.0%], 9.0% [1.0%], 9.1% [1.3%], 9.5% [1.6%], and 10.1% [1.7%], respectively (p<0.0001; Table **3**). Mean target HbA1c was significantly different between target groups, ranging from 6.4 [0.4] to 10.5 [15.4], p<0.00010. Across the age subgroups, there were significant differences in the proportion of patients with hypertension (present in 36.4%–88.9% of patients, p<0.0001), dyslipidemia (11.0%–55.6%; p<0.0001), and CKD (12.2%–38.9%, p=0.0391). The risk of renal impairment over the next two to three years also significantly differed among the age groups (p<0.0001).

3.2. Treatment Management in Routine Clinical Practice

3.2.1. Current Treatment

Most patients were currently on first-line therapy (73.0%), followed by second-line (25.5%) and third-line (1.0%) therapy; the mean number of lines of therapy a patient had received was 1.3 [0.5]. Overall, the mean time since initiation of current treatment from the point of data collection was 3.1 [2.6] years.

Treatment initiated at first line (n=699) was most frequently metformin (29.2%), an oral fixed metformin/dipeptidyl peptidase-4 inhibitor (DPP-4i) combination (28.5%), or an oral fixed metformin/sodium-glucose co-transporter-2 inhibitor (SGLT-2i) combination (24.6%), followed by a DPP-4i (14.5%) or a SGLT-2i (13.6%) alone. Treatment class prescribed at second line (n=175) was most frequently an oral fixed metformin/DPP-4i combination (44.6%), followed by an oral fixed metformin/SGLT-2i combination (27.4%), a SGLT-2i (24.0%), metformin (17.1%), DPP-4i (14.9%), and glucagon-like peptide-1 receptor agonist (GLP-1 RA; 12.6%). Very long-acting insulin was received by 4.9% of patients at first-line and 10.9% of patients at second-line treatment.

Across all stratification factors, patients were most frequently switched to their current treatment due to inadequate HbA1c reduction (59.1%), followed by lack of glucose control (45.5%), and new clinical trial results (23.6%). Poor patient adherence to treatment and increased CV risk were reasons for switching therapy for 14.1% and 16.5% overall patients, respectively. Insurance coverage was also an important factor in treatment switching, being reported for between 3.7 and 27.5% of patients, with a significant difference between treating physician specialty (p=0.0248) and HbA1c level (p=0.0005).

Overall, physicians reported that the majority of patients were fully compliant (taking >80% of the prescribed dose) with treatment (77.5%). The most frequently reported reasons for noncompliance with treatment were: poor self-monitoring of glucose levels (32.4%), forgetfulness (31.3%), and lack of routine (30.8%).

3.2.2. Split by HbA1c Level

At the point of data collection, patients with a higher HbA1c level were less likely to be prescribed metformin than those with a lower HbA1c level (p=0.0006; Table **4**).

Table 4: Physician-reported management of patients with type 2 diabetes in routine clinical practice in the United Arab Emirates, stratified by HbA1C level at start of regimen.

	<7% *n*=21	**≥7%–<7.5% *n*=44**	**≥7.5%–<8% *n*=79**	**≥8.0% *n*=704**	***p* value (test)**
Current treatment class (≥5% of all patients), *n* (%)					(FE)
Oral fixed metformin/DPP-4i combination	5 (23.8)	17 (38.6)	23 (29.1)	253 (35.9)	0.431
Oral fixed metformin/SGLT-2i combination	4 (19.1)	9 (20.5)	24 (30.4)	212 (30.1)	0.4254
Metformin	8 (38.1)	12 (27.3)	23 (29.1)	109 (15.5)	0.0006
SGLT-2i	5 (23.8)	11 (25.0)	20 (25.3)	119 (16.9)	0.1313
DPP-4i	5 (23.8)	7 (15.9)	6 (7.6)	92 (13.1)	0.1796
GLP-1 RA	3 (14.3)	6 (13.6)	11 (13.9)	59 (8.4)	0.161
Long-acting insulin	1 (4.8)	2 (4.6)	3 (3.8)	50 (7.1)	0.7525

3.2.3. Split by Obesity Status

There was no significant difference in the duration of the current treatment between patients with and without obesity, 3.1 [2.4] and 3.2 [2.6] years, respectively (p=0.7107). The switch from previous to current therapy for patients with and without obesity had taken 3.6 [3.6] vs 3.2 [3.3] years. The proportion of patients who switched treatment due to inadequate HbA1c reduction and new clinical trial results was significantly greater for patients with obesity than for patients without obesity (72.3% vs 49.7%; p=0.0009, 34.9% vs 14.3%; p=0.0004, respectively). The proportion of patients prescribed a GLP-1 RA at the point of data collection was over three-fold greater in patients with obesity than in patients without obesity (p<0.0001; Table **5**).

Table 5: Physician-reported management of patients with type 2 diabetes in routine clinical practice in the United Arab Emirates, stratified by obesity level status at start of regimen.

	Without obesity *n*=669	**With obesity *n*=180**	***p* value (test)**
Current treatment class (≥5% of all patients), *n* (%)			(FE)
Oral fixed metformin/DPP-4i combination	220 (36.4)	72 (31.3)	0.1937
Oral fixed metformin/SGLT-2i combination	165 (27.3)	82 (35.7)	0.0218
SGLT-2i	114 (18.8)	37 (16.1)	0.4207
Metformin	107 (17.7)	40 (17.4)	1
DPP-4i	71 (11.7)	34 (14.8)	0.2437
GLP-1 RA	35 (5.8)	44 (19.1)	<0.0001
Long-acting insulin	38 (6.3)	14 (6.1)	1

3.2.4. Split by Age

At the point of data collection, use of DPP-4i (p=0.0003) and of long-acting insulin (p<0.0001) were significantly different across the age category Table **6**). Duration of current treatment for patients significantly differed across the age subgroups (p<0.0001) Among the more common reasons reported for non-compliance, forgetfulness was significantly different between age groups (p=0.0006).

4. Discussion

This real-world analysis showed that a significant number of patients with T2DM in the UAE in this study cohort may not be reaching their target HbA1c levels with their current prescribed treatment. Failure to meet treatment goals despite receiving at least one prescribed antidiabetic medication, following guideline recommendations, and good treatment compliance may indicate suboptimal prescribing practices and therapeutic inertia among healthcare providers. Higher BMI, older age, and longer time since diagnosis

Table 6: Physician-reported management of patients with type 2 diabetes in routine clinical practice in the United Arab Emirates, stratified by age.

	≤40 years *n*=264	41–50 years *n*=276	51–60 years *n*=241	61–70 years *n*=50	>70 years *n*=18	*p* value (test)
Current treatment class (≥5% of all patients), *n* (%)						(FE)
Oral fixed Metformin/DPP-4i combination	84 (31.8)	99 (35.9)	85 (35.3)	21 (42.0)	9 (50.0)	0.3781
Oral fixed Metformin/SGLT-2i combination	77 (29.2)	76 (27.5)	77 (32.0)	12 (24.0)	8 (44.4)	0.4257
SGLT-2i	43 (16.3)	46 (16.7)	48 (19.9)	13 (26.0)	5 (27.8)	0.2902
Metformin	55 (20.8)	44 (15.9)	39 (16.2)	11 (22.0)	3 (16.7)	0.4868
DPP-4i	36 (13.6)	32 (11.6)	27 (11.2)	6 (12.0)	10 (55.6)	0.0003
GLP-1 RA	17 (6.4)	35 (12.7)	21 (8.7)	5 (10.0)	1 (5.6)	0.1542
Long-acting insulin	9 (3.4)	18 (6.5)	13 (5.4)	9 (18.0)	7 (38.9)	<0.0001

DDP-4i, Dipeptidyl peptidase-4 inhibitor; FE, Fisher's exact test; GLP-1 RA, glucagon-like peptide-1 receptor agonist; HbA1c, glycated hemoglobin; SGLT-2i, sodium-glucose co-transporter-2 inhibitor.

were linked to higher HbA1c levels, as well as increased rates of comorbidities and risk factors associated with CVD and CKD.

The analysis investigated three different stratification factors of patients with T2DM in the UAE, focusing on HbA1c level, obesity status, and age. Overall, patients had an average age of 46 years, were predominantly male, and overweight. Mean age of patients with T2DM in this UAE cohort was 46, compared to 37 and 61 in previous studies in the UAE [18, 19]. The outcomes also show that patients with T2DM in the UAE have high rates of comorbidities, which were significantly affected by HbA1c levels, obesity status, and age. We found that nearly one-third of patients were 40 years old or younger, supporting the recommendation to screen for diabetes starting at age 30 in the UAE [14]. Our results are supported by previous research, which has shown positive correlations between HbA1c and BMI [23], and HbA1c and age [24].

Four-fifths of the study sample were overweight or obese, with only one-fifth of all patients having a normal BMI. Obesity was associated with high comorbidity rates, contributing to increased risk of a CV event and CKD impairment. Additionally, over 70% of patients with a BMI of <30 kg/m^2 were overweight, with high rates of hypertension and dyslipidemia, and a relatively high proportion were at moderate estimated risk of a CV event. This is in line with US data showing that as BMI increased, there was a corresponding decrease in the proportion of adults with T2DM achieving glycemic control. Across all years, a higher BMI was associated with higher HbA1c values, with findings consistent across different age groups [23].

The analysis showed that patients with obesity – thought to be less responsive to therapy [25] – experienced longer delays to initial diagnosis and had higher HbA1c levels compared to patients without obesity. They had also been diagnosed with T2DM for longer than those without obesity. Such factors

may have been key to them not achieving HbA1c targets and increasing their risk of short- and long-term complications. Additionally, the treatment received by patients with obesity may suggest a lack of implementation of treatment guidelines, as approximately one-third of patients with obesity were receiving metformin/SGLT-2i combination or metformin/DPP-4i combination.

To achieve and maintain glycemic and weight management goals, current guidelines recommend a GLP-1 RA as a treatment with high to very high efficacy for attaining both glycemic and weight loss goals, and with higher efficacy compared to an SGLT-2i and a DPP-4i [15]. Despite this, our analysis found that a GLP-1 RA was prescribed for one-fifth of patients with obesity at current therapy. Such a delay in treatment intensification to GLP-1 RA for patients (85% with obesity) not under glycemic control was reported in a previously reported survey [26].

The risk of CVD rises rapidly with age, which increases the likelihood of CVD-related risk factors, such as blood pressure, hyperlipidemia, and diabetes [28]. Indeed, HbA1c, rates of obesity, CVD-related risk factors, and risks of a CV event and renal impairment were significantly different between age groups in our study. Considering the association between aging and increasing HbA1c [24], older patients require different management strategies than younger adults. However, before setting glycemic targets and a treatment strategy, the overall health, comorbidities, and cardiovascular risk factors of older adults with T2DM need to be considered [27]. Many older patients had an HbA1c of ≥8.5%, yet <40% of them had a set target HbA1c of <7%, highlighting the need for their better management alongside a proactive approach to their treatment.

We found that patients' HbA1c targets set by physicians varied significantly between HbA1c levels and age groups, but did not change with obesity status. Management guidelines recommend that glycemic targets are patient-centered. An HbA1C goal of <7% is appropriate for many non-pregnant adults, although comorbidities, established vascular complications, disease duration, life expectancy, adverse events, hypoglycemia risk, patient preference, and resources/support may be considered to determine the patient's optimal target [8].

Our analyses suggest that suboptimal treatment of patients with T2DM may have contributed to worsening glycemic control. Considering patients had generally lived with the T2DM diagnosis for nearly six years and that physicians had not introduced current treatments until the HbA1c level was over 8.5%, these findings suggest earlier introduction of perhaps more potent therapies for glycemic control is warranted. A high proportion of patients may benefit from treatment intensification [28, 29], combination therapy [30], or a treatment switch [31]. Patients with uncontrolled CV risk factors may also benefit from medications such as antihypertensives and lipid-regulating drugs. Factors associated with not achieving a glycemic goal include a high glycemic target, a complex treatment regimen, and physician-reported patients' unwillingness to intensify treatment [29]. Comorbidities, alongside complicated treatment regimens for T2DM patients, have been suggested to impact on intensification of therapy, patient treatment adherence, and, in turn, patients' ability to reach and maintain clinical targets [32].

Therapeutic inertia, whereby therapy is not intensified or is withheld [16], was common among physicians in the UAE, affecting all patients with diabetes. For all patient stratification factors, HbA1c had either not improved or had worsened while on previous antidiabetic therapy. Despite this, physicians generally allowed delays of up to five years before switching their patients from their prior therapies to their current treatment. This may also be due to nonmedical factors, as insurance coverage was a common cause for treatment switch in our cohort, suggesting physicians may be limited in prescribing optimal treatment by financial considerations. Moreover, while patients' HbA1c had been reduced on their current treatment, it had not achieved target levels after approximately two to four years.

Over 70% of patients were on their first line of treatment at time of survey, despite receiving a T2DM diagnosis for four years or more. Management guidelines recommend pharmacologic approaches that provide adequate efficacy to achieve and maintain treatment HbA1c goals [15]. We found that physicians used metformin alone to treat nearly 30% of their patients with an HbA1c level of ≥8.5%. While metformin is generally used as a first-line glucose-lowering treatment [33], many patients with T2DM will require combination therapy or a more potent glucose-lowering medication to achieve and maintain their HbA1c target [15, 33]. Furthermore, data suggest patients with obesity may be less responsive to their treatment, leaving their T2DM below target HbA1c and increasing their risk of complications.

Overcoming such therapeutic inertia is necessary to prevent both microvascular and macrovascular complications of diabetes [8]. Therapeutic inertia may be addressed by managing physician-, patient-, and healthcare system-related factors, such as implementing patient referrals, individualized therapy reflecting patients' needs, physician–patient discussions, and education [34].

This analysis also highlighted the unmet need for new and novel advanced therapies. Poor glycemic control was the most common reason to switch from previous to current treatment, despite the high rate of compliance with currently available antidiabetic medications. Antidiabetic medications are known to become ineffective over time, with patients experiencing progressive deterioration in glycemic control [35]. Physicians should therefore adjust patients' therapy, select approaches with a higher likelihood of efficacy, and utilize combination therapy.

5. Limitations

The cross-sectional nature of the Adelphi Real World Diabetes Disease Specific Programme prevents any conclusions about causal relationships, although identification of statistically significant associations is possible. Physicians were selected based on the number of patients with T2DM seen; therefore, the physicians were experienced with treating T2DM, and their patient load and standard of care may not reflect those of more general practitioners. Generalization of the findings to all patients with T2DM may also be limited, as the analysis may represent the burden and outcomes of patients who were more

severely affected by T2DM and therefore visited their physician more often. The patient's financial status and nationality were not collected in this study; therefore, we cannot report this data.

A strength of this study is that it utilizes real-world data collected using the DSP methodology, which employs a standardized methodology and is well-validated. Nevertheless, our findings should be considered with the limitations of the Adelphi Real World Diabetes DSP survey. Data for patients in the age subgroups 61–70 and >70 years should be viewed with caution, as patient numbers for some assessments were too low for meaningful interpretation.

6. Conclusion

This analysis found that a high proportion of patients with T2DM in the UAE included in this study were not reaching their target HbA1c despite receiving at least one prescribed antidiabetic treatment. HbA1c was positively correlated with age, BMI, and time since diagnosis, indicating that patients who had T2DM for a longer time or had a high BMI with associated comorbidities required more efficacious treatment. Faster treatment switching or use of more optimal treatments would aid in improving glycemic control and outcomes in this patient population.

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Statement of Ethics

This study was granted ethical exemption by the Pearl Institutional Review Board, approval number [22-ADRW-152]. Using a checkbox, patients provided informed consent to take part in the survey. Data were collected in a manner that prevented patients and physicians from being directly identified. Physician and patient data were pseudo-anonymized. A code was assigned when the data were collected. Upon receipt by ARW, the data were pseudo-anonymized again to mitigate against tracing them back to the individual. Data were aggregated before being shared with the subscriber and/or for publication. Data collection was undertaken in line with European Pharmaceutical Marketing Research Association (EphMRA) guidelines [37].

Conflict of Interest Statement

FA, AJ, TF, KH, MH, TI, FT, and SR are employees of Eli Lilly and Company and have stocks/shares in Eli Lilly and Company. KT and LH are employees of Adelphi Real World.

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Data collection was undertaken by Adelphi Real World as part of an independent survey, entitled the Adelphi Real World T2DM DSP. Eli Lilly and Company did not influence the original survey through either contribution to the design of questionnaires or data collection. The analysis described here used data from the Adelphi Real World Diabetes DSP. The DSP is a wholly owned Adelphi Real World product, and Eli Lilly and Company is subscribed to the DSP. Publication of survey results was not contingent on the subscriber's approval or censorship of the publication.

Author Contributions

Tatjana Isailovic was responsible for clinical oversight and guidance as lead author. All authors were involved in 1) conception or design, or analysis and interpretation of data; 2) drafting and revising the article; 3) providing intellectual content of critical importance to the work described; and 4) final approval of the version to be published, and therefore meet the criteria for authorship in accordance with the International Committee of Medical Journal Editors guidelines. In addition, all named authors take responsibility for the integrity of the work as a whole and have given their approval for this version to be published.

Data Availability Statement

All data, i.e., methodology, materials, data and data analysis, that support the findings of this survey are the intellectual property of Adelphi Real World.

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