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Patient and physician perspectives and experiences of basal insulin titration in type 2 diabetes in the United States: Cross-sectional surveys

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Abstract

Aim: Patient- and physician-associated barriers impact the effectiveness of basal insulin (BI) titration in the management of type 2 diabetes (T2D). We evaluated the experiences of patients with T2D and physicians with BI titration education.

Materials and Methods: In this observational, cross-sectional study, patients with T2D and physicians treating patients with T2D were identified by claims in the Optum Research Database and were invited to complete a survey. Eligible patients had 12 months of continuous health-plan enrolment with medical and pharmacy benefits during the baseline period, and recent initiation of BI therapy. Eligible physicians had initiated BI for ≥1 eligible patient with T2D during the past 6 months.

Results: In total, 416 patients and 386 physicians completed the survey. Ninety per cent of physicians reported treating ≥50 patients with T2D; 66% treated ≥25% of patients with BI. Whereas 74% of patients reported that BI titration was explained to them by a physician, 96% of physicians reported doing so. Furthermore, 20% of patients stated they were offered educational materials whereas 56% of physicians reported having provided materials. Physicians had higher expectations of glycaemic target achievement than were seen in the patient survey; their main concern was the patients' ability to titrate accurately (79%).

Conclusions: There is a marked difference in patients' and physicians' experiences of BI titration education. Novel tools and strategies are required to enable effective BI titration, with more educational resources at the outset, and ongoing access to tools that provide clear, simple direction for self-titration with less reliance on physicians/health care providers.

KEYWORDS
basal insulin, glycaemic control, hypoglycaemia, observational study, type 2 diabetes

1 | INTRODUCTION

Current guidance for the initial treatment of type 2 diabetes (T2D) is dependent upon patient comorbidities and specific treatment determinants, but generally involves the use of oral glucose-lowering therapies. However, because of the progressive natural history of the disease, oral antidiabetic treatment is only sufficient to achieve glycaemic control for a few years,[1] and many people with T2D eventually require basal insulin (BI) therapy to improve glycaemic control.[2–4] Early control of T2D could reduce the risk of major chronic diabetes-related complications, particularly microvascular disease, which remains a substantial burden.[5–8] Treatment of diabetes has advanced substantially in the last two decades,[9,10] but unfortunately this has not translated into improvement of glycaemic control in patients with T2D.[11–13] For example, a recent multinational survey of physicians reported that only 39% of patients with T2D had achieved their personalized blood-glucose goal (i.e. their HbA1c target).[14]

Physician- and patient-derived barriers often delay the initiation of BI therapy and titration, leading to suboptimal management of T2D.[15] One such barrier is lack of comprehensive patient education, which is an essential component for effective BI titration.[2,16] In one study, 45% of health care providers (HCPs) in the United States, France and Germany reported that providing education and training on BI titration was extremely/very challenging because of limitations on their time spent with patients.[17] For these HCPs, perceived patient-derived barriers included fear of hypoglycaemia, hesitancy to increase dosage in the absence of symptoms, low involvement/motivation and concerns about weight gain.[17]

Experiencing hypoglycaemia can have a significant impact on the physical and mental health of patients with T2D.[18,19] Unpredictability can cause anxiety and fear of hypoglycaemic events and their adverse effects. This, in turn, can lead to avoidance behaviours, such as changes in eating habits and physical activity, and deterioration of therapy adherence and diabetes control, in addition to reduced treatment satisfaction.[20–23] Repeated episodes increase the risk of patients experiencing severe hypoglycaemia, which can potentiate impairment of hypoglycaemia awareness[24,25]; this is associated with an increased risk of mortality.[24–27]

Knowledge of the perspectives of patients and physicians on their experiences with BI titration instruction is lacking. To address this knowledge gap, the primary objective of this study was to evaluate and compare the experiences of patients with T2D and physicians with regard to BI titration education.

2 | MATERIALS AND METHODS

2.1 | Study design and participants

A full description of this observational, cross-sectional survey has been provided previously.[28] Patients enrolled in the study were identified via medical and pharmacy records from the Optum Research Database (ORD). Physicians associated with the claims of patients with T2D in the ORD were included as potential participants. Physicians were not necessarily those who treated the participants in the current study, and if they were, these data were never linked. In total, 2200 patients and 2693 physicians were invited directly by mail to participate in the survey, with a target sample of 400 completed surveys for each group. Survey questionnaires pertinent to this analysis are provided in Supplementary Information.

For the survey selection, patients ≥18 years of age were required to have had ≥2 medical claims with a T2D diagnosis ≥30 days apart in the 12-month sample-identification period (1 April 2020-31 March 2021 or 1 May 2020-30 April 2021 for waves 1 and 2, respectively); and ≥1 pharmacy claims for BI analogue (i.e. insulin glargine 100 U/ml, glargine 300 U/ml, detemir, or degludec) in the most recent month of pharmacy data (the earliest BI fill was the index date). Patients must have had 12 months of continuous enrolment with medical and pharmacy benefits before the index date (baseline period), a self-reported T2D diagnosis in the patient survey and recent initiation of BI therapy. Patients were excluded if they had a pharmacy or medical claim for any insulin during the baseline period (before the index BI fill) or ≥1 medical claim with a diagnosis for type 1 diabetes during the baseline period.

Eligible physicians were HCPs who had treated ≥1 eligible patient with T2D (i.e. patients who met the above selection criteria for the patient survey), but initiated BI in the most recent 6 months. Physicians were excluded if they had received visits from <30 patients with T2D during the most recent 12-month period.

The study received ethics approval and a waiver of authorization from the institutional review board (WCG IRB approval no. 20211238). The study included patients with commercial insurance and Medicare Advantage health plan members, and both patients and physicians were remunerated for their time.

2.2 | Outcome measures

The patient survey collected information on patient demographic and sociodemographic characteristics, and experiences with BI titration, specifically: titration resources; HCP interactions; self-management of the titration process; experience of hypoglycaemia; titration status; and personalized titration goal attainment. Hypoglycaemia was defined in the survey as blood glucose level <70 mg/dl, according to the American Diabetes Association; severe hypoglycaemia was defined as requiring assistance from another person for recovery.[25] The patient survey included the 10-item version of the Patient Activation Measure (PAM).[29] From the total PAM score (0-100 with higher scores indicating higher activation), participants were categorized into one of four activation levels: 'Disengaged and overwhelmed'; 'Becoming aware, but still struggling'; 'Taking action'; and 'Maintaining behaviours and pushing further'. The eight-item Diabetes Treatment Satisfaction Questionnaire, status version (DTSQs©) included two items assessing hyperglycaemia and hypoglycaemia perception (each item having a score 0-6 with lower scores representing better perception of glucose control).[30] The physician survey was descriptive in nature and collected information on physician and practice characteristics, current practices and challenges for managing titration.

TABLE 1 Patient and physician characteristics

Patient characteristics	N = 416
Age, years; mean (SD)	70.1 (9.5)
Age group, years; n (%)	N = 416
<55	25 (6)
55-64	73 (18)
65-74	184 (44)
≥75	134 (32)
Female, n (%)	N = 415
	204 (49)
Race, n (%)	N = 410
American Indian or Alaska Native	7 (2)
Asian or Pacific Islander	12 (3)
Black or African American	78 (19)
White	290 (71)
Other	28 (7)
Hispanic or Latino ethnicity, n (%)	N = 404
Yes	42 (10)
Education level, n (%)	N = 411
Less than high school	48 (12)
High school or equivalent	220 (54)
College graduate (2- or 4-year degree)	108 (26)
Graduate school	35 (9)
BMI, kg/m^2, mean (SD)	N = 407
	32.26 (7.16)
BMI category, kg/m^2; n (%)	N = 407
Underweight (<18.5)	3 (1)
Normal weight (18.5 to <25.0)	51 (13)
Overweight (25.0 to <30.0)	115 (28)
Obese (≥30.0)	238 (58)
Age at T2D diagnosis, years; mean (SD)	N = 388
	51.27 (13.86)
Time since T2D diagnosis, years; n (%)	N = 387
<5	48 (12)
5-10	61 (16)
>10	278 (72)
Provider specialty on BI pharmacy fill, n (%)	N = 416
Allied health professional	64 (15)
Family/general practice	50 (12)
Internal medicine	47 (11)
Endocrinology	22 (5)
Other	8 (2)
Unknown	225 (54)
BI used, n (%)	N = 416
Insulin glargine 100	238 (57)
Insulin glargine 300	42 (10)
Insulin detemir	62 (15)
Insulin degludec 100 U/ml	46 (11)

(Continues)

TABLE 1 (Continued)

Patient characteristics	**N = 416**
Insulin degludec 200 U/ml	18 (4)
Combination	10 (2)
Time since BI initiation, months; n (%)[a]	N = 350
<1	6 (2)
1 to <2	20 (6)
2 to <3	72 (21)
3 to <4	92 (26)
≥4	125 (36)
Unknown	35 (10)
BI starting dose, units/day; mean (SD)[b]	N = 263
	15.16 (6.80)
Physician characteristics	**N = 386**
Age group, years; n (%)	N = 382
25-34	11 (3)
35-44	67 (18)
45-54	93 (24)
55-64	131 (34)
65-74	74 (19)
≥75	6 (2)
Female, n (%)	N = 383
	115 (30)
Medical specialty, n (%)	N = 384
Family/general practice	174 (45)
Internal medicine	117 (30)
Endocrinology/diabetology	81 (21)
Gerontology	3 (1)
Other[c]	9 (2)
Number of years practising medicine (excluding residency), years; n (%)	N = 384
<5	13 (3)
5 to <10	44 (11)
10 to <15	42 (11)
15 to <20	44 (11)
≥20	241 (63)
Practice setting, n (%)	N = 382
Urban	91 (24)
Suburban	181 (47)
Rural	110 (29)
Clinic setting, n (%)	N = 383
Independent free standing	225 (59)
Part of a linked health setting or larger network	158 (41)
Number of patients with T2D treated in the last 6 months, patients; n (%)	N = 386
<10	1 (0.3)
10-24	7 (2)
25-50	29 (8)
>50	349 (90)

TABLE 1 (Continued)

Physician characteristics	N = 386
Proportion of patients with T2D in the last 6 months treated with BI, %; n (%)	N = 384
<25	131 (34)
25-50	180 (47)
51-75	52 (14)
>75	21 (5)

Abbreviations: BI, basal insulin; BMI, body mass index; SD, standard deviation; T2D, type 2 diabetes.
[a]Results were derived analytically.
[b]BI dosages <5 units/day and >30 units/day were set to missing.
[c]Others include combinations of listed specialities.

2.3 | Analyses

The analysis population consisted of respondents with complete, evaluable data; the full analysis set comprised all respondents who provided responses to >80% of survey questions. All survey variables were analysed descriptively, using numbers and percentages for dichotomous and polychotomous variables, and means (standard deviations) for continuous measures. Self-reported BI dosage values that fell outside reasonable expected ranges were set to missing, including dosages <5 units/day, starting dosages >30 units/day and current dosages >80 units/day. In addition to these analyses, a descriptive comparison of survey participants and non-participants was performed during the claims' analysis to assess the generalizability of the survey sample. All statistical analyses were performed using SAS version 9.4 (SAS Inc.).

3 | RESULTS

3.1 | Study population

The overall response rates for patients and physicians were 21.1% and 14.4%, respectively. A detailed description of the patient population has been reported elsewhere[28] and is summarized here. Of the 2200 patients invited in two waves (1642 in wave 1 and 558 in wave 2), 416 were deemed eligible, completed a survey, and were included in the analysis. The mean age of patient responders at T2D diagnosis was 51 years and 72% reported having T2D for >10 years (Table 1). Characteristics of participants and non-participants were comparable; however, participants tended to be slightly older and there was a higher proportion of Medicare Advantage enrollees compared with non-participants (Table S1).

For physicians (N = 386), the top three self-reported medical specialties were family/general practice (45%), internal medicine (30%) and endocrinology/diabetology (21%). Within the previous 6 months, 90% of physicians reported treating >50 patients with T2D and 66% treated ≥25% of their patients with T2D using BI therapy (Table 1).

3.2 | Basal insulin titration education and access to health care providers

Almost three-quarters of patients (74%) reported that an HCP explained BI titration to them when they were first prescribed it. In contrast, nearly all physicians (96%) indicated that they explained the titration process to patients new to BI. For this, 89% reported speaking with all or most of their patients, and 11% reported speaking with a select number of patients. Sixty-two per cent of patients reported being offered in-office training and 84% of physicians reported that this was provided (Figure 1). One-fifth of patients (20%) reported that they were offered educational materials, while a similar percentage (21%) indicated that they were not offered any resources or training when they started BI. Over half of physicians (56%) reported that they provided educational materials, while <1% indicated that they did not provide any resources. Forty-five per cent of physicians indicated concerns about availability of education and resources for patients and 49% were concerned about lack of clinical support staff [e.g. Certified Diabetes Educators (CDEs)] to follow-up with patients during titration (Figure 2A).

For frequency of patient-HCP interactions during titration, 68% of patients reported communicating with a physician every 2 or 3 months, while 47%, 43% and 42% reported communication with a nurse, CDE or another type of HCP, respectively, every 2 or 3 months. Fifteen per cent of patients communicated with a physician monthly, with 14%, 14% and 17% of patients, respectively, interacting monthly with a nurse, CDE or other HCP. Fortnightly HCP interactions were reported by 4%-10% of patients and weekly interactions by 2%-7% (Figure S1A). From the physicians' survey, 36% of physicians reported that they or a member of their clinical team saw patients who were titrating BI (virtually or in-office) monthly, 33% every 2-3 weeks, 28% at a follow-up visit 3 months after initiation and 17% weekly during the first 4 weeks (Figure S1B). Patients reported interactions with HCPs through office visits (67%-95%), phone calls (21%-43%), video visits (4%-7%), online messaging/emails (4%-7%) and mailed information (2%-4%). Sixty-four per cent of patients reported that they had the same number of interactions during the COVID-19 pandemic as before the pandemic (with 32% reporting fewer and 3% more), while 70% of physicians reported the same frequency of interactions with their patients before and during the

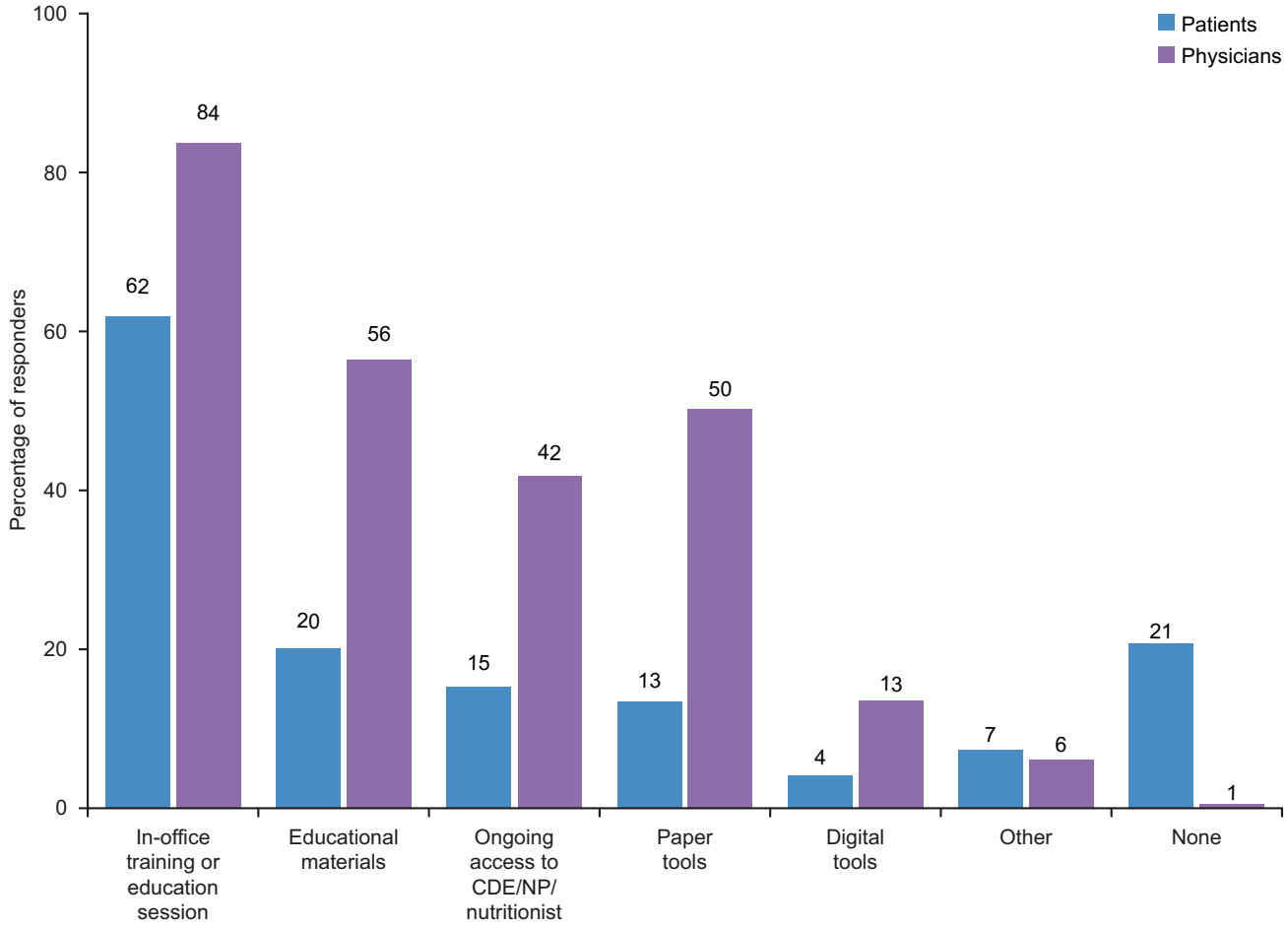

FIGURE 1 Summary of survey responses for BI titration education received by patients (N = 411) or provided by physicians (N = 386). BI, basal insulin; CDE, certified diabetes educator; NP, nurse practitioner.

COVID-19 pandemic (with 27% reporting fewer, and 2% more). For patient satisfaction, 27% of patients were extremely satisfied with support from providers, 40% were very satisfied, 21% were moderately satisfied, 8% were slightly satisfied and 5% were not at all satisfied.

3.3 | Managing the titration process

The mean starting dose of BI recorded in the patient survey was 15 units/day and mean current dose when completing the survey was 29 units/day. The majority of physicians (60%) expected patients to monitor their blood glucose and provide them with the resulting data so that they could calculate insulin dosage and manage their patients' titration process; 27% expected their patients to utilize the resources and tools provided to self-manage their titration process by monitoring their blood glucose and calculating insulin dosage on their own (Figure 2B). Physicians reported concerns about topics relating to their patients' BI titration (previously noted in Figure 2A). Their greatest concerns were the ability of patients to follow the titration algorithm provided to them (79%) and the lack of patient engagement in the titration process (72%).

For adherence, 48% of patients said they always followed the instructions of their HCPs regarding blood glucose monitoring, while 36% said they 'usually' did so. Ninety per cent of patients reported tracking their fasting blood glucose (FBG), 67% tracked their non-fasting blood glucose, 75% tracked their BI dose and 42% tracked 'other' measures such as carbohydrate intake, caloric intake and physical activity. For those who tracked blood glucose, 90% used a self-monitoring glucose meter; less than 5% of patients used either flash glucose monitoring (4%) or continuous glucose monitoring (2%).

Regarding how confident patients felt in their ability to track accurately the different measures, confidence levels were generally high. Approximately three-quarters of patients reported that they felt extremely or very confident in tracking FBG (75%), non-fasting blood glucose (76%) and BI dose (74%); in addition, 63% felt extremely or very confident in tracking other measures. A further proportion felt moderately confident in tracking measures (FBG 16%; non-fasting blood glucose 16%; BI dose, 19%; other measures 20%) (Figure S2). In relation to engagement, the mean total PAM score was 65 and patients were categorized into one of four levels according to their score. The largest proportion of patients (39%) were at level 3, 'Taking

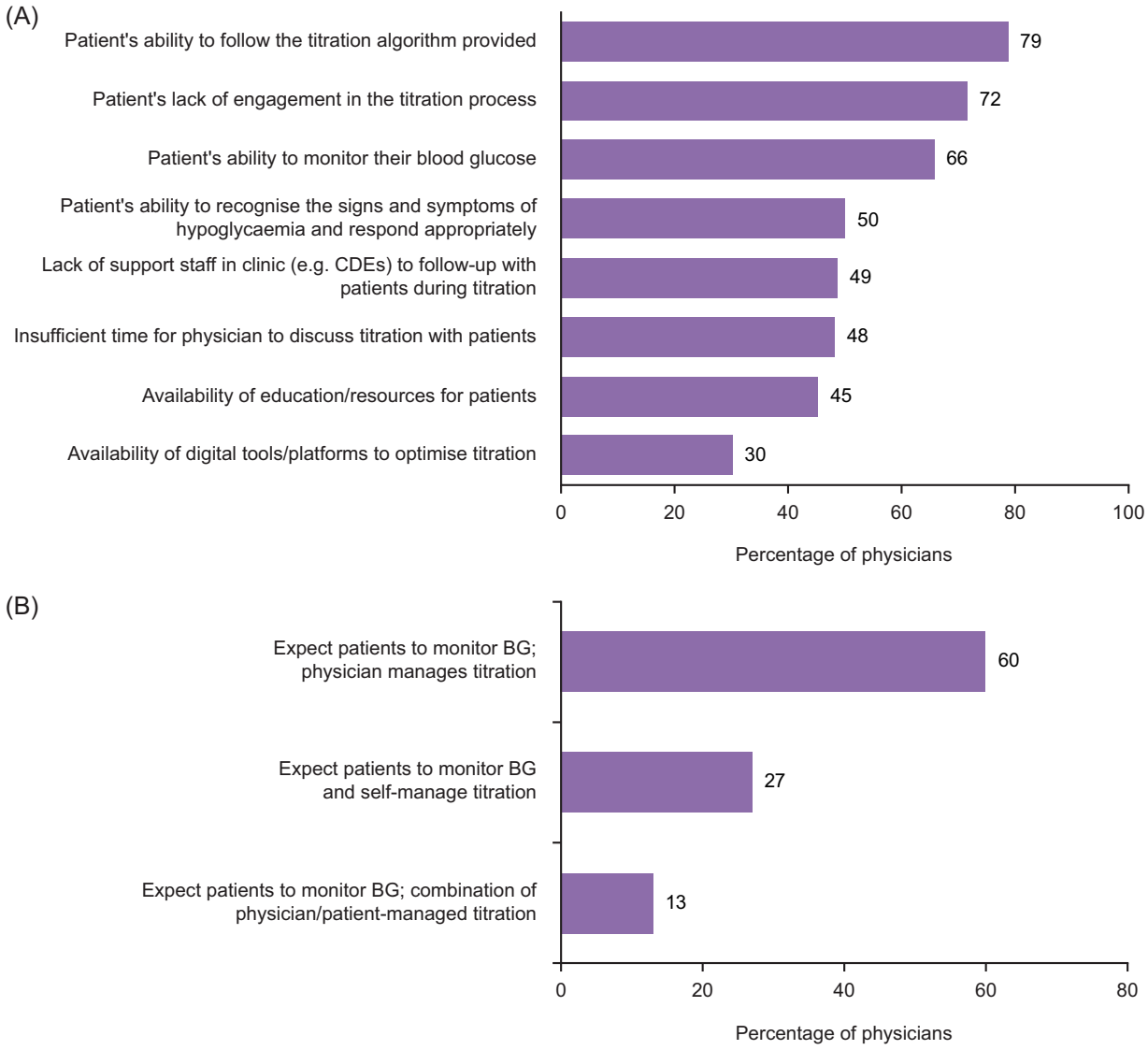

FIGURE 2 (A) Physicians' concerns about BI titration (N = 377) and (B) physicians' expectations for basal insulin management (N = 386). BG, blood glucose; CDE, certified diabetes educator.

action'. Only 6% were categorized as level 1, 'Disengaged and overwhelmed'.

For estimates of success, 35% of patients indicated that they met their FBG goal and maintained a relatively stable daily insulin dose, 58% had not met their goal and were still titrating, and 7% of patients had stopped using BI. Of patients who had resources provided, 39% had met their FBG goal compared with 23% of patients who had no resources provided ($p = .012$). From the physicians' perspective, 51% reported that less than a quarter of their patients with T2D who started BI in the last 6 months were unable to reach their HbA1c goal, and 39% of physicians reported that 25%-50% of patients were unable to do so (Figure 3A). According to the 27 (6%) patients who provided enough information, mean time-to-goal attainment was 63 days (i.e. 9 weeks) and most physicians expect it would take 5-12 weeks for patients to titrate BI and achieve their glucose control goal (Figure 3B).

3.4 | Hypoglycaemia during basal insulin titration

In total, 204 patients (49%) experienced hypoglycaemia while titrating and 19% experienced severe hypoglycaemia. The rate of FBG target achievement was similar for participants who did and did not experience hypoglycaemia (36% and 34%, respectively; $p = .66$). During a 1-month period, 33% of patients experienced hypoglycaemia once, 32% twice, 22% three to four times and 12% ≥5 times. Of those who reported hypoglycaemia, 64% noted that hypoglycaemia occurred when they were awake, 32% when they were asleep and 16% could not recall the time when they experienced hypoglycaemia. In the DTSQ, the mean score for the question 'how often have you felt that your blood sugars have been unacceptably low?' was 1.34 of 6. In response to hypoglycaemia, 19% of patients were extremely confident, 38% were very confident, 27% were moderately confident, 6% were slightly confident and 10% were not at all confident in managing

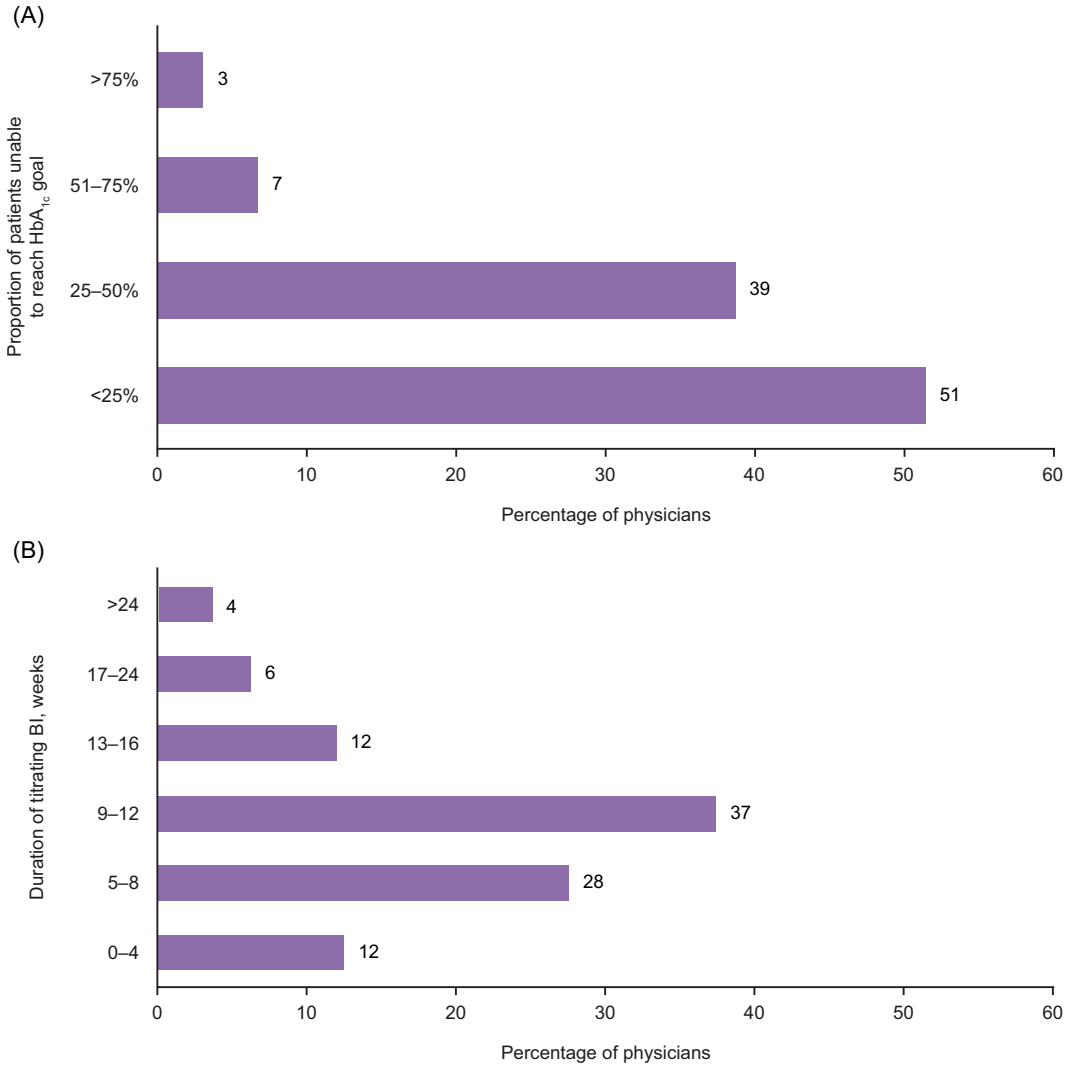

FIGURE 3 Survey results for glycaemic target achievement. (A) Proportion of patients who started BI therapy in the last 6 months and were unable to achieve their blood glucose target (HbA1c goal) as reported by physicians (N = 385). (B) Expected time required for patients to titrate BI and achieve their glucose-control goal reported by physicians (N = 385). BI, basal insulin; HbA1c, glycated haemoglobin.

their titration by adjusting their insulin dose (Figure 4). While 57% of patients said they felt extremely or very confident in managing their BI dose in response to hypoglycaemia, only 50% of physicians were confident that patients could recognize the symptoms and respond appropriately.

Most physicians reported that they discussed the signs and symptoms of hypoglycaemia (93%), how to monitor blood glucose to watch for hypoglycaemia (87%) and how to adjust BI doses in response to blood glucose readings (81%). Three physicians (1%) reported that they did not discuss hypoglycaemia with their patients.

4 | DISCUSSION

This study reports experiences of BI education and treatment as reported by both patients with T2D and physicians. Participants were identified by screening a large health care claims database. While most patients were satisfied with the support they received during BI titration, physicians were concerned about the level of support provided to patients and the availability of resources for BI titration education. Although most patients with T2D who were initiating BI therapy received resources and training to support BI titration, there were marked differences between the educational resources that physicians reported providing compared with those that patients reported receiving. In general, the numbers of patients who reported being offered each type of resource were lower than the number of physicians who reported providing these resources. Fewer patients reported having access to office training, education sessions, educational materials, paper and digital tools, and ongoing access to a CDE/nutritionist/nurse practitioner than would be indicated by physician responses. Furthermore, 21% of patients reported that they were not offered any training or resources when starting BI, but <1% of physicians indicated that they did not provide training support to patients initiating BI. These discrepancies may be because of

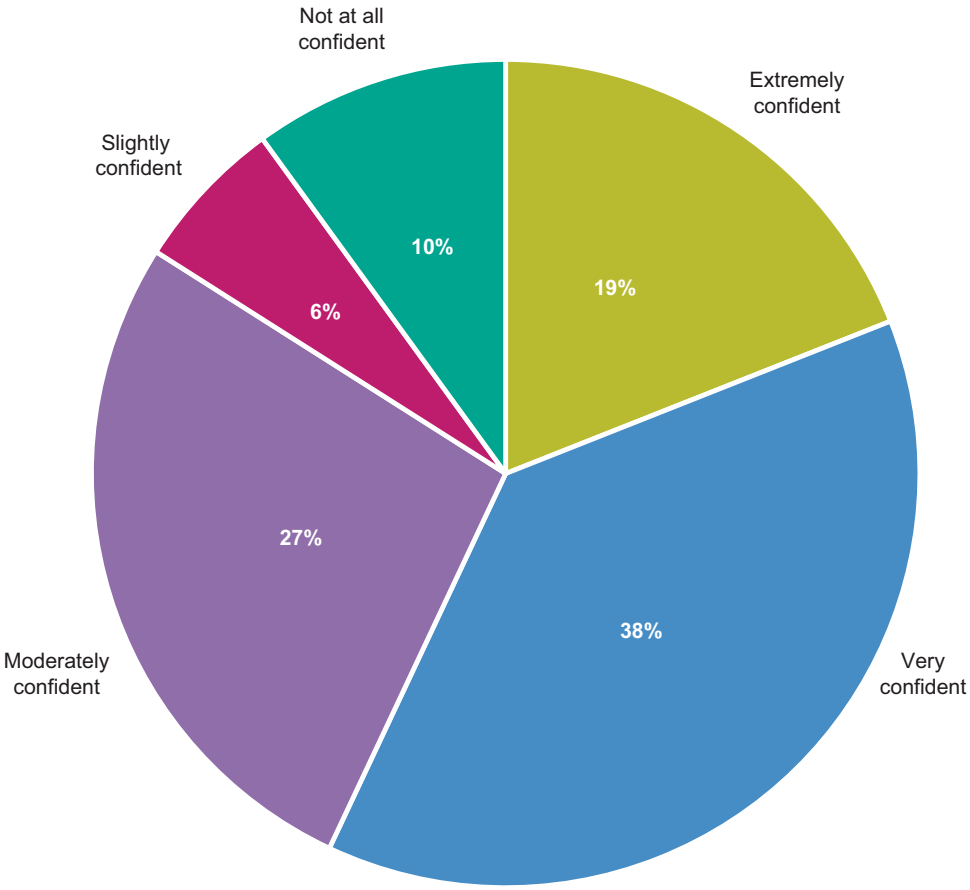

FIGURE 4 Patients' confidence levels in managing their basal insulin dose when experiencing hypoglycaemia (N = 187).

differences in education and training provided by HCPs between centres. In addition, physicians who completed the survey did not necessarily treat the patients who participated in the survey.

The initial period of BI titration is crucial for achieving glycaemic targets. The results from one international observational study of patients with T2D initiating BI have indicated that mean HbA1c decreases most sharply in the first 3 months post-BI initiation but then remains fairly constant for the next 2 years, and that most patients will not have achieved their HbA1c target by 2 years post-BI initiation.[13] In addition, dose adjustments after the titration period are less frequent for maintenance of targets.[31] Support for patients is essential whether they are receiving HCP-directed titration or are self-titrating BI, and focusing on patient education enables patients to achieve their glycaemic targets with low rates of hypoglycaemia through self-titration.[16]

Three-quarters (74%) of patients starting BI therapy recalled that they had BI titration explained to them. This is lower than the percentages of physicians who said they explained titration to patients new to BI (96%) and spoke to all or most of their patients (89%). Most physicians reported that they saw patients monthly or every 2-3 weeks while titrating, which contrasts with patients who claimed they mostly interacted with HCPs every 2-3 months. The COVID-19 pandemic did not appear to reduce the frequency of interactions with HCPs for approximately two-thirds of patients; patients' and physicians' responses were consistent. Many physicians were concerned about a lack of support staff to follow-up with patients during titration, and 30% of physicians were concerned about availability of digital tools/platforms to optimize titration. Digital tools were the least-reported resource provided to aid BI titration in both surveys. In a large multinational study, patients reported that their willingness and confidence to self-titrate would be improved if resources such as simple titration algorithms and patient-support programmes were more readily available.[17] A meta-analysis of randomized-controlled trials suggested that patient-led BI titration is non-inferior to physician-led titration in patients with uncontrolled T2D in terms of efficacy and safety.[32] Although the intention of this survey was not to evaluate HCP-led titration versus self-titration, the latter is known to be empowering for patients and can improve motivation to reach treatment targets.[16] While physicians in this study indicated they were concerned about the ability of patients to self-manage titration and the perceived lack of patient engagement in the process, the patients themselves reported that they were satisfied overall with the support they received during BI titration and were confident tracking their blood glucose, BI dose and other lifestyle measures to control their T2D. Patients were also engaged with managing their health.

While information on FBG targets was not collected, physicians were asked to estimate how long they expected patients to titrate and achieve their goals. Most physicians expected patients to achieve their individual goal within 12 weeks and reported a higher rate of glycaemic target achievement by their patients compared with self-reported results in the patient survey. While 90% of physicians estimated that more than half of their patients who had initiated BI in the last 6 months were able to achieve their goals, only 35% of patient responders reported that they had met their FBG goal. This contrast in expectations and perceived target achievement may be because of differences in training and support provided by HCPs across the

United States. Furthermore, the physicians who responded were not linked to the patient responders. These results suggest that initial BI training may not be sufficient and that additional tools should be developed that provide patients with clear and simple direction to self-titrate with potentially less reliance on HCP guidance. For the small number of patients who had provided enough information to calculate, mean time-to-goal attainment was 9 weeks, which is within physicians' expectations of the time taken for BI titration.

The rate of hypoglycaemia in patients during BI titration was high and experienced in nearly half of respondents. In the DTSQ, however, the mean hypoglycaemia score of 1.34 suggests that, in general, patients did not think their blood glucose levels were unacceptably low. While physicians educated patients on hypoglycaemia awareness and BI titration, they had concerns about the ability of patients to recognize the signs and symptoms of hypoglycaemia and respond appropriately. This contrasts with the fact that only a small proportion of patients (16%) reported no or slight confidence in managing their BI dosage when experiencing hypoglycaemia. Real-world evidence points to higher-frequency estimates of hypoglycaemic events than derived from traditional glucose-lowering trials, particularly in patients with T2D, which may explain the hypoglycaemia rates seen in the current study.[33–38] This highlights the potential for under-reporting of level 2/3 hypoglycaemic events,[39] which suggests an even greater impact of hypoglycaemia on patients than previously thought. While most patients felt confident adjusting their BI dose in response to hypoglycaemia, they probably require ongoing access to a nurse practitioner, CDE or nutritionist to assist them to titrate effectively.

A key strength of this study is that it evaluated perspectives from both patients and physicians. Furthermore, the survey respondents are derived from the ORD database, which includes ethnically and geographically diverse data from 1993 to the present day for >73 million people, and the patient population race and ethnicity were representative of the US population.[40] Limitations of this study were that patient participants were mainly enrolled in Medicare Advantage (93%), the majority of patient responders were 65 years or older, and the patient population mean age was 70 years. Therefore, the results may not be representative of other populations of people with T2D. Although higher survey response rates have been seen,[41,42] a low response rate might be expected given the high disease burden among this patient population and the timing during the COVID-19 pandemic. This may potentially limit the generalizability of our results to a wider population. In addition, although patients were recruited as close as possible to their BI initiation date, most received the survey between 2 and 4 months after BI initiation; therefore, there is the potential for recall bias, and confirmatory data, such as from patient charts, were not obtained. As patients followed their personalized FBG targets set by their physician, these were not defined in the study. A further limitation is that the patients and physicians who responded were not linked. The survey was completed during the COVID-19 pandemic, which may have affected the frequency or quality of patient-physician interactions in some instances. However, changes to diabetes care that occurred because of the pandemic may continue in the future, and the frequency of interactions between patients and HCPs had not changed as a result of the pandemic for two-thirds of patients.

5 | CONCLUSIONS

In this observational study, a disconnect was seen between patients' and physicians' perceptions of initiating BI titration. Overall, although most patients with T2D were satisfied with the support they received during BI titration, only about a third of patients had reached their FBG target. This contrasts with reports from physicians, the majority of whom estimated that at least half of their patients who started BI in the last 6 months were able to reach their HbA1c goal. Most physicians expected to continue instruction with patients after initial BI training and expressed concerns both about patients' ability to manage titration and about the availability of resources to support patients. Patients perceived that they had received less support and fewer resources than physicians reported having offered. Novel tools and strategies may be required to enhance the effectiveness of BI titration, in particular for self-titration. More educational resources should be made available to patients at the outset; after initial BI training, tools are needed that provide clear and simple direction for self-titration with less ongoing guidance required from HCPs. Standardization of the training and support provided for people with T2D initiating BI across the United States is recommended.

AUTHOR CONTRIBUTIONS

All named authors meet the International Committee of Medical Journal Editors (ICMJE) criteria for authorship for this article, had full access to all the data in this study and take complete responsibility for the integrity of the data and accuracy of the data analysis. All authors participated in the interpretation of the data, the writing, reviewing, and editing of the manuscript, and had final responsibility for approving the published version.

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CONFLICT OF INTEREST STATEMENT

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PEER REVIEW

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DATA AVAILABILITY STATEMENT

The data contained in our database contains proprietary elements owned by Optum and, therefore, cannot be broadly disclosed or made publicly available at this time. The disclosure of this data to third party clients assumes certain data security and privacy protocols are in place and that the third-party client has executed our standard license agreement which includes restrictive covenants governing the use of the data.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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