

Patient Perceptions of Diabetes Guideline Frameworks for Individualizing Glycemic Targets

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[+ Supplemental content](#)

IMPORTANCE Diabetes guidelines recommend considering specific factors, such as diabetes duration and life expectancy, to individualize treatment in older adults. These individualized glycemic targets inform decisions on whether to intensify or deintensify medication treatment plans. How older adults with diabetes perceive these factors used to individualize glycemic targets is unknown.

OBJECTIVES To examine how older adults perceive factors used in diabetes guidelines for individualizing glycemic targets.

DESIGN, SETTING, AND PARTICIPANTS A cross-sectional national survey was conducted from December 13, 2018, to January 3, 2019, of a nationally representative, probability-based online survey panel (KnowledgePanel). A total of 1364 KnowledgePanel members who were 65 years or older and had type 2 diabetes were invited to participate in the survey; 836 (61.3%) responded, and 818 (60.0%) completed the survey.

MAIN OUTCOMES AND MEASURES The study randomized participants to 2 vignettes: one about adding and the other about removing diabetes medications from treatment plans. Participants rated the importance of 7 factors (diabetes duration, established diabetes complications, other health conditions, life expectancy, risk of adverse effects, cost, and treatment effort) in these treatment decisions using binary (yes/no) responses and the best-worst scaling method to quantify the factors' relative importance. All participants then answered questions on how different levels of each factor were associated with aggressiveness of diabetes treatment.

RESULTS The sample included 818 participants (mean [SD] age, 74.0 [6.8] years; 469 [53.7%] male; and 668 [67.7%] white). A total of 410 participants answered questions about adding medicine, whereas 408 participants answered questions about stopping medicine. Of the 7 factors to consider for adding a diabetes medication to the treatment plan, the number who deemed each factor important ranged from 197 (45.6%) to 263 (62.8%). In contrast, these same factors were considered important by only 29 (8.4%) to 146 (37.7%) of participants when deciding to stop use of a diabetes medication. In both decisions, participants perceived the risk of adverse effects as the most important factor (relative importance was 22.8 for adding a medicine and 25.0 for stopping a medicine on a ratio scale in which, for each decision, the relative importance of the 7 factors adds up to 100, with 0 indicating complete indifference and 100 complete priority). In contrast to current guideline recommendations, most participants believed that patients with longer disease duration (498 [60.1%]), more established complications (632 [75.6%]), and greater number of other health conditions (545 [67.5%]) should receive more aggressive diabetes treatment.

CONCLUSIONS AND RELEVANCE Many older adults do not place high importance on factors recommended by guidelines to individualize diabetes treatment, especially when deciding to stop use of diabetes medications. Moreover, when considering treatment aggressiveness, many older adults weighted several factors in the opposite direction than suggested by the guidelines. Individualizing diabetes care in older adults will require effective communication regarding the benefits and consequences of making changes to treatment plans.

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Type 2 diabetes is a common condition among older adults, but the optimal treatment target for this population remains uncertain.^{1,2} The benefit of tight glycemic control is often delayed by many years, but the risks of hypoglycemia and polypharmacy and the burden of intensive treatment occur in the short term and are more common in older adults.¹⁻⁸ Guidelines increasingly recognize that tight glycemic control may at times pose more harms than benefits and recommend individualized glycemic targets in older adults based on consideration of specific patient factors.⁹⁻¹³ For example, multiple guidelines recommend considering the patient's life expectancy when choosing glycemic targets. Specifically, a less stringent glycemic target is recommended in people with short life expectancy, whereas a more stringent target is recommended in those with long life expectancy.⁹⁻¹³ Other factors mentioned in the guidelines for individualizing glycemic targets include diabetes duration, other comorbidities, diabetes complications, risk of adverse effects or hypoglycemia, patient preference, treatment burden, cost, patient resources, and patient motivation.⁹⁻¹³ The individualized glycemic target then, in turn, informs decisions about whether to intensify or deintensify medication treatment plans. However, despite the guidelines, glycemic control among older adults is suboptimal and overtreatment is common.¹⁴⁻¹⁸

How older adults with diabetes perceive the factors used to individualize glycemic targets and decide on medication intensification or deintensification is unknown. Existing literature on patient preferences in diabetes often focuses on comparing specific treatment options or weighing treatment outcomes against specific adverse effects and/or cost.¹⁹⁻²⁴ Glucose control and avoiding hypoglycemia are important concerns for patients, but patient priorities in this tradeoff are mixed.²⁴ To our knowledge, no prior study has examined how patients view the factors used in guidelines to determine individualized glycemic targets. If the guideline rationales for how to individualize diabetes treatment are not intuitive to patients, the ability for engaging patients in collaborative goal setting and shared decision-making, both of which are important for high-quality diabetes care, could be severely impaired.^{25,26}

This study used a national survey to examine how older adults perceive and prioritize the factors (eg, shorter life expectancy) used to individualize diabetes treatment in clinical practice guidelines.⁹⁻¹³ Given the prevalence of potential overtreatment,¹⁴⁻¹⁸ we were particularly interested in treatment deintensification and examined separately the importance of these factors in the decision to add medicines vs the decision to remove medicines from the treatment plans.

Methods

Study Design and Sample

This cross-sectional online survey used the KnowledgePanel, the largest national probability-based online panel, with more than 55 000 members representing the US adult population. Panel members were randomly recruited by random digit

Key Points

Question How do older adults perceive factors used in diabetes guidelines to individualize glycemic targets?

Findings In this cross-sectional national online survey of 818 US adults 65 years and older with type 2 diabetes conducted from December 13, 2018, to January 3, 2019, the importance of 7 factors in diabetes treatment decisions and perceptions of how factors affected treatment intensity were assessed. Participants considered the factors important when adding medicines to their treatment plans but less important when removing medicines from their treatment plans; participants believed that patients with longer disease duration, more established complications, and more other health conditions should receive more aggressive treatment, which is opposite to guideline recommendations.

Meaning Older adults' beliefs about certain guideline factors for diabetes treatment are in opposition to what the guidelines recommend, which may present substantial barriers to appropriate treatment goals and care.

dialing (until 2009) and address-based sampling (since 2009).²⁷ Households without computers or internet access were provided with both. A total of 1364 panel members were invited to participate via email if they were at least 65 years old, spoke English, and had type 2 diabetes according to KnowledgePanel's baseline information on members. A total of 836 (61.3%) responded, and 818 (60.0%) completed the survey (the other 18 did not confirm that they have type 2 diabetes). We independently confirmed whether a person had been told by a physician that they had type 2 diabetes and those who answered yes were invited to complete the survey. This study was approved by a Johns Hopkins University School of Medicine Institutional Review Board. The beginning of the survey stated that completion of the survey serves as consent to be in this research study. The data from KnowledgePanel were deidentified.

Survey Instrument

Details about the survey instrument are included in the eMethods in the Supplement. We briefly described the benefits of lowering blood glucose levels in patients with diabetes (reducing the risk of damage to eyes, kidneys, heart, and nerves) and the risks of intensive treatment (increased adverse effects and burden). To limit survey length and response burden, we randomized participants to 1 of 2 modules that asked about the importance of 7 predefined factors in the decision to add a diabetes medication (module 1A) or the decision to remove a diabetes medication (module 1B) from the treatment plan. Then, all participants completed a module that asked how aggressive diabetes treatment should be at different levels of each factor (module 2), which was designed to assess how participants perceived the directionality of the effect for each factor (eg, if shorter vs longer life expectancy was perceived to be associated with aggressive diabetes treatment). We pilot tested the survey instrument with 11 older adults who were not included in the study and iteratively revised the instrument based on feedback.

Factors Tested in the Survey

In modules 1A and 1B, we asked about the perceived importance of 7 factors in the decision to add or remove a diabetes medication from a treatment plan: (1) diabetes duration, (2) established diabetes complications, (3) other health conditions, (4) life expectancy, (5) risk of adverse effects from treatment (referred to in the survey as "side effects"), (6) treatment cost, and (7) treatment effort. We chose the factors primarily based on the American Diabetes Association's framework for individualizing glycemic targets. We also reviewed other relevant major clinical guidelines and modified the factor descriptions to be consistent⁹⁻¹³; the factor descriptions were also informed by feedback during pilot testing.

Module 1A: Decision About Adding a Medicine

We described a hypothetical patient with a hemoglobin A1c (HbA_{1c}) level of 8.0% who was deciding whether to add a diabetes medication to his/her treatment plan and asked whether each of the 7 factors described above was a good reason to add a diabetes medication. We chose this HbA_{1c} value because it was mentioned in the American Diabetes Association guideline as a less stringent treatment target.¹⁰

Guidelines recommend less aggressive diabetes treatment for patients with longer diabetes duration, established vascular complications, shorter life expectancy, more comorbidities, and higher risk of adverse effects.⁹⁻¹³ In addition, high treatment cost and high treatment effort are barriers to medication adherence.²⁸ Therefore, each factor is described in a way that reflects its directional effect per the guidelines or literature. For example, diabetes duration is described as "has had diabetes a short time" when asking whether it is a good reason for adding a medicine to the treatment plan.

We first asked these questions with binary responses (yes/no); we also used a stated preference method called best-worst scaling to assess the relative importance among the factors. The best-worst scaling technique presents participants with a list of items and asks them to choose the 1 item that they consider the best (most important) and the 1 item that they consider the worst (least important).²⁹⁻³¹ This technique allows for comparison of relative values across items, something that is not possible with traditional Likert scale surveys.²⁹⁻³¹ As part of this technique, only a subset of all items is presented at a given time in a single choice task, and the participant is asked to complete a series of choice tasks in which the items in each choice task are systematically varied. The survey included 7 choice tasks, each displaying 4 of the 7 factors. An example of a best-worst scaling choice task is included in the eMethods in the Supplement.

Module 1B: Decision About Removing a Medicine

We described a hypothetical patient with an HbA_{1c} value less than 7.0% who is deciding whether to stop use of a diabetes medication. We chose this HbA_{1c} value because it is considered a more stringent treatment target in clinical guidelines.^{9,10,12} We stated that the physician will monitor the patient's response after stopping use of the medicine and make changes if needed. We asked about the importance of the same 7 factors in module 1A, with the factor descriptions now reflecting the opposite extreme; for example, diabetes duration is described

as "has had diabetes a long time" when asking about whether it is a good reason for stopping use of a medicine.

Module 2: Factors and Treatment Aggressiveness

We assessed the perceived effect of each factor on the aggressiveness of diabetes treatment. The term aggressive was selected after pilot testing found it to be more preferred than tight, intensive, or stringent. Participants were presented with 2 hypothetical patients with varying levels or values of a factor and then asked which patient should have more aggressive diabetes treatment. We examined 5 factors from module 1A and module 1B, omitting treatment cost and treatment effort because they have been studied previously.^{19,20,23,24} Each factor was tested individually without mention of the other factors. For example, we asked whether "a person who has no complications from diabetes" or "a person who has severe complications from diabetes" should have more aggressive treatment for diabetes.

KnowledgePanel provided information on age, sex, race/ethnicity, and educational level of the study participants. We collected additional information, including self-reported diabetes duration, presence of diabetes complications, type of diabetes medications, most recent HbA_{1c} value, willingness to stop use of diabetes medications, health literacy,³² health and functional status,³³ and decision-making preferences.³⁴ Life expectancy was estimated from these data using a validated index.³³

Data Collection

Data collection occurred from December 13, 2018, to January 3, 2019. Survey weights were applied to account for any differential nonresponse that may have occurred in specific demographic groups. Responses to the binary questions in modules 1A and 1B were compared using 2-sample proportion *z* tests. To analyze best-worst scaling response data, we used a conditional (fixed-effects) logistic regression model in which the 7 factors were the independent variables and the dependent variable was choosing a factor as best (+1), worst (-1), or neither best nor worst (0). The SEs were clustered by respondent to account for repeated choices. Results were rescaled to a ratio scale that ranged from 0 to 100 for ease of interpretation, with a score of 0 indicating complete indifference and 100 indicating complete priority.³⁵

Statistical Analysis

Participant characteristics and responses in module 2 were analyzed descriptively. As sensitivity analyses, we stratified the participant responses by participants' own diabetes duration, most recent HbA_{1c} value, and history of hypoglycemia to explore whether participants' own experiences influenced their responses. All statistical analyses were performed using Stata, version 14 (StataCorp LLC). A 2-sided *P* < .05 was considered to be statistically significant.

Results

The sample included 818 participants (mean [SD] age, 74.0 [6.8] years; 469 [53.7%] male; and 668 [67.7%] white) (Table 1). A total of 371 participants (44.6%) reported having

Table 1. Participant Characteristics

Characteristic	Finding ^a (N = 818)
Age, mean (SD), y	74.0 (6.8)
Male sex	469 (53.7)
Race/ethnicity	
White, non-Hispanic	668 (67.7)
Black, non-Hispanic	67 (14.9)
Hispanic	53 (9.4)
Other	30 (8.0)
Time since diabetes diagnosis, y	
<5	141 (16.9)
5 to <10	163 (19.0)
10 to <15	207 (24.5)
15 to <20	142 (19.5)
≥20	163 (20.1)
Has ever had a heart attack, coronary artery disease, or stroke	217 (27.8)
Has eye disease from diabetes	81 (12.0)
Has kidney disease from diabetes	80 (10.5)
Has nerve damage from diabetes	265 (32.1)
Diabetes medications	
None	64 (10.1)
Oral medications only	522 (61.0)
Injection medications only	58 (9.1)
Oral and injection medications	168 (19.7)
Frequency of checking blood glucose level	
More than once a day	215 (27.8)
Once a day	229 (26.0)
One or more times a week but not every day	157 (20.9)
Less than once a week	216 (25.3)
Hypoglycemia in last 12 mo	
None	443 (55.4)
1 Time	85 (10.5)
2-5 Times	207 (25.1)
>5 Times	79 (9.0)
Most recent HbA _{1c} value	
<7.0%	464 (53.8)
7% to <8%	210 (26.2)
8% to <9%	47 (5.4)
≥9%	26 (3.0)
Don't know	68 (11.6)
Has had discussion with physician about goal HbA _{1c}	630 (73.3)
Self-reported goal HbA _{1c}	
<7.0%	601 (67.5)
7% to <8%	81 (11.9)
8% to <9%	3 (0.4)
≥9%	4 (0.6)
Don't know	123 (19.6)
Physician has recommended stopping use of diabetes medication	209 (23.5)
Would be willing to stop use of diabetes medication	719 (87.8)
Estimated life expectancy, ³³ y	
>10	432 (48.0)
4-10	279 (38.6)
<4	75 (13.4)

(continued)

Table 1. Participant Characteristics (continued)

Characteristic	Finding ^a (N = 818)
Educational level	
Did not complete high school	29 (6.9)
Completed high school	206 (44.2)
<4-y College	305 (24.6)
College graduate or postgraduate degrees	278 (24.3)
Health literacy (possible range, 3-15), ³² mean (SD)	13.0 (2.2)
Decision-making preferences ³⁴	
Make own decisions	250 (31.3)
Make decisions together with physician	541 (64.6)
Leave decision to physician	26 (4.1)

Abbreviation: HbA_{1c}, hemoglobin A_{1c}.^a Data are presented as number (percentage) of survey respondents unless otherwise indicated. Means and percentages are weighted.

hypoglycemic symptoms in the previous 12 months. A total of 464 participants (53.8%) reported that their most recent HbA_{1c} value was less than 7.0%, and 601 (67.5%) reported that their goal HbA_{1c} value was less than 7.0%. Only 209 (23.5%) reported that their physician ever recommended stopping use of a diabetes medication; 719 (87.8%) would be willing to stop use of a diabetes medication if recommended by their physician.

Module 1A: Decision About Adding a Medicine to a Diabetes Treatment Plan

For each of the 7 factors, we asked 410 participants whether the factor was a good reason to add a medicine to a diabetes treatment plan. Responses ranged from 197 (45.6%) who considered having “few other health conditions” to be a good reason to add a medicine to a treatment plan to 263 (62.8%) who considered having “had diabetes for a short time” to be a good reason to add a medicine (Table 2). A total of 346 (86.0%) considered at least 1 of the 7 factors a good reason for adding a diabetes medication to a treatment plan, and 108 (23.3%) considered all 7 factors to be good reasons. According to the best-worst scaling, the most important reason to add a medicine to a treatment plan was low risk of adverse effects from diabetes treatment, whereas the least important reason to add a diabetes medication to a treatment plan was low treatment cost (Figure).

Module 1B: Decision About Removing a Medicine From a Diabetes Treatment Plan

We asked 408 participants whether each of the 7 factors was a good reason to stop use of a diabetes medication. Responses ranged from 29 (8.4%) who considered having “to spend a lot of effort to manage diabetes” as a good reason to stop use of a medicine to 146 (37.7%) who considered having “a high chance of side effects” as a good reason to stop use of a medicine (Table 2). A total of 202 participants (46.9%) thought that none of the 7 factors was a good reason to stop use of a diabetes medication. In contrast to the results about adding a medicine to a treatment plan, far fewer participants considered the same factors important for stopping use of a medicine (Table 2).

Table 2. Participants' Perceptions of Factor Importance in Diabetes Treatment Decisions^{a,b}

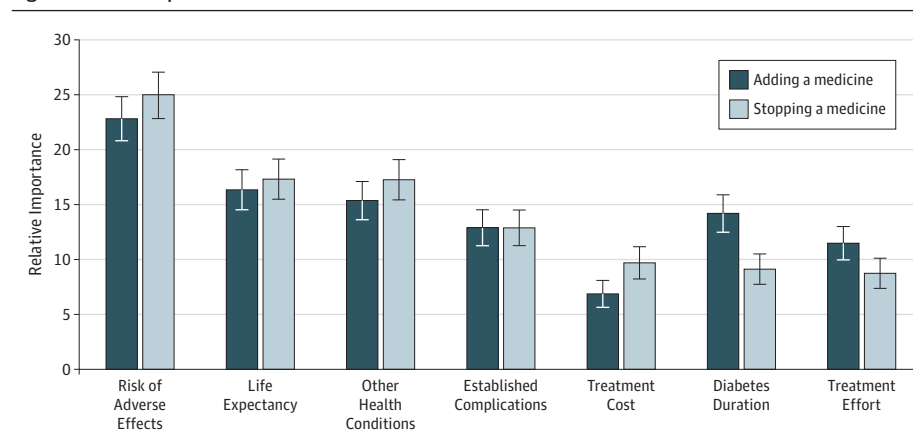
Factor	Good Reason to Add a Medicine to a Treatment Plan? (n = 410)	No. (%)	Good Reason to Remove a Medicine From a Treatment Plan? (n = 408)	No. (%)
Diabetes duration	Has had diabetes a short time	263 (62.8)	Has had diabetes a long time	37 (9.4)
Established complications	Has no significant diabetes complications	213 (48.8)	Already has severe diabetes complications	62 (18.4)
Other health conditions	Has few other health conditions	197 (45.6)	Has many other serious health conditions	52 (15.1)
Life expectancy	Expected to live a long time	230 (51.9)	Not expected to live a long time	42 (9.6)
Risk of adverse effects	Has a low chance of adverse effects from diabetes treatment	226 (54.6)	Has a high chance of adverse effects from diabetes treatment	146 (37.7)
Treatment cost	Has to pay little money for diabetes treatment	209 (51.2)	Has to pay a lot of money for diabetes treatment	63 (14.8)
Treatment effort	Has to spend little effort to manage diabetes	221 (53.4)	Has to spend a lot of effort to manage diabetes	29 (8.4)
None of the factors	NA	64 (14.0)	NA	202 (46.9)
All the factors	NA	108 (23.3)	NA	4 (0.5)

Abbreviation: NA, not applicable.

^a Percentages are weighted.

^b Comparison used 2-sample proportion z test. $P < .001$ for all comparisons.

Figure. Relative Importance of the 7 Factors in Diabetes Treatment Decisions



The results are plotted on a ratio scale in which, for each decision, the relative importance of the 7 factors adds up to 100.³⁵ A score of 0 indicates complete indifference, and 100 indicates complete priority at the expense of all other factors. A factor with a score of 10 indicates that it is twice as important as a factor with a score of 5.

Despite the marked difference in how participants perceived the absolute importance of the factors in the 2 treatment decisions, the relative importance of the factors was similar (Figure). The risk of adverse effects was the most important factor in both decisions (its relative importance was 22.8 for adding a medicine and 25.0 for stopping a medicine on a ratio scale in which, for each decision, the relative importance of the 7 factors adds up to 100, with 0 indicating complete indifference and 100 complete priority), followed by life expectancy and other health conditions. Factors with lower relative importance were treatment effort and treatment cost.

Module 2: Association Between Levels of Each Factor and Aggressiveness of Diabetes Treatment

We found that the 818 participants' perceptions regarding how different levels of each factor related to aggressiveness of treatment were the opposite of guideline recommendations for 3

of the 5 factors (Table 3). Although guidelines recommend less aggressive treatment for patients with longer diabetes duration,^{10,13} 498 participants (60.1%) believed that someone with longer diabetes duration should be treated more aggressively than someone with shorter duration. In opposition to guidelines,¹⁰⁻¹³ 632 participants (75.6%) chose more aggressive diabetes treatment for a person who already has severe complications from diabetes compared with no complications, and 545 (67.5%) chose more aggressive treatment for a person with many other health conditions compared with no other health conditions. The participants' perceptions agreed with guideline recommendations for life expectancy (613 [72.7%]) and risk of adverse effects (672 [78.2%]).⁹⁻¹³ In sensitivity analyses, we found that participants' responses did not vary by their own HbA_{1c} value or history of hypoglycemia. We observed some differences in responses when stratified by participants' diabetes duration but did not find a clear pattern (eTable in the Supplement).

Table 3. Participant Perceptions of the Association Between Different Factor Levels and Aggressiveness of Diabetes Treatment^a

Hypothetical Patient	No. (%) of Participants (n = 818)	Participant Perception Relative to Guideline Recommendations ⁹⁻¹³
Diabetes duration		
A person who has had diabetes for 5 y ^b	319 (39.9)	Discordant
A person who has had diabetes for 15 y	498 (60.1)	
Established complications		
A person who has no complications from diabetes ^b	185 (24.4)	Discordant
A person who has severe complications from diabetes	632 (75.6)	
Other health conditions		
A person who has no other health conditions ^b	273 (32.5)	Discordant
A person who has many other health conditions	545 (67.5)	
Life expectancy		
A person who will live for another 5 y	204 (27.3)	Concordant
A person who will live for another 15 y ^b	613 (72.7)	
Risk of adverse effects		
A person who probably will have adverse effects	144 (21.8)	Concordant
A person who probably will not have adverse effects ^b	672 (78.2)	

^a Participants were asked, "Which hypothetical patient should have more aggressive treatment for diabetes?"

^b The choice recommended by guidelines.

Discussion

We conducted a national survey examining how older adults perceived the importance of factors used in diabetes guidelines to individualize glycemic targets and how older adults perceived the association between these factors and aggressiveness of diabetes treatment. This study had several key findings. Participants viewed the factors as important in the decision to add a diabetes medication to a treatment plan. However, in the decision to remove a medicine from a treatment plan, nearly half did not think any of the 7 factors was important. The relative importance of the different factors in adding and removing medicines from treatment plans was similar, with concern about treatment adverse effects being the most important. Finally, participants' beliefs about how these factors affect diabetes treatment were often opposite to the guideline recommendations.

Our finding that the participants considered all 7 factors more important for adding than for removing medicines from treatment plans has important implications in light of the high rate of potential overtreatment for diabetes in older adults and the increasing attention on deprescribing.^{14-18,36,37} Our result suggests that diabetes medication intensification and deintensification may not merely be the reverse of one another but may represent distinct processes. Even though most partici-

pants reported willingness to stop use of a diabetes medication, almost half of the participants did not consider any of the 7 factors that we examined in this study to be an important reason for doing so, raising significant questions as to what patients think should drive the decision-making. Literature³⁸⁻⁴⁰ on patient experiences of stopping or reducing use of medications is limited, and none focused on diabetes medications. A study⁴¹ of long-term care residents found that continuity of care and focus on patient well-being were highly ranked concerns for patients when deprescribing medications. Another study⁴² found that patients were passive toward medication reduction and depended on their physicians to initiate medication changes. These factors (ie, practitioner recommendation) can be explored in future studies to better understand patient priorities in deprescribing decisions.

Using the method of best-worst scaling, we identified the relative priority of the 7 factors in diabetes treatment decisions. Previous studies^{19,20,23,24} have examined patients' priorities regarding 3 of the factors examined in this study (cost, treatment burden, and risk of adverse effects), whereas the other 4 have not been systematically studied to our knowledge. Risk of adverse effects was the most important factor in both decisions to add and remove a diabetes medication. Extensive literature^{20,24} has demonstrated that adverse effects are an important consideration for patients when choosing among alternative therapies; our result adds to this literature by reporting that adverse effects are also important in the context of stopping use of medications. We were surprised that life expectancy was the second most important factor in both decisions. A previous study⁴³ found that, in the context of cancer screening, there was significant mismatch between the guidelines and patient understanding about using life expectancy in decision-making. How older adults with diabetes view life expectancy and consider it in diabetes decisions needs to be examined further. We found that treatment cost and effort were among the least important factors in both decisions. Previous studies^{23,24} often examined cost in terms of willingness to pay for a better treatment effect and/or fewer adverse effects. Our study extends this prior research by showing that cost, at least in abstract form (ie, described as having to spend "a little" vs "a lot" on diabetes treatment), is of low relative importance. Consistent with our results, treatment burden in terms of mode or frequency of drug administration has not been found in prior studies^{20,24} to be a strong factor in treatment preference.

The participants in this study believed that 3 of the factors (diabetes duration, established complications, and other health conditions) should influence aggressiveness of diabetes treatment in the opposite direction than what guidelines recommend.⁹⁻¹³ The study design did not allow us to explore the reasons for these responses. They may reflect low awareness and knowledge of the guidelines among patients.⁴⁴ The results may also reflect different values and priorities among the patients compared with the guidelines. This area is important to explore in future studies. This finding suggests that the rationales explaining how guidelines use diabetes duration, established diabetes complications, and the pres-

ence of other health conditions to individualize glycemic targets are not intuitive to many patients. These participants' opposite beliefs can make it more difficult for practitioners to discuss individualized diabetes treatment and lead to misguided preferences, contributing to both overtreatment and undertreatment. It is important to make clinical practice guidelines more transparent and accessible to patients and make guideline language more patient centered. The results also suggest that individualized glycemic targets are not easy or intuitive concepts for patients to grasp and developing effective strategies to communicate with patients and engage patients in making individualized treatment decisions is critical.

Limitations

Our study has several limitations. First, the survey used hypothetical scenarios, and participants' responses may not fully reflect their behaviors. However, prior studies^{45,46} in vaccination and diabetes treatment suggest that participants' stated preferences in hypothetical situations can be highly predictive of actual behaviors. In the absence of validated instruments, descriptions of the hypothetical scenarios were developed by the study team and revised based on feedback during pilot testing. Second, we examined a limited number of factors and did not include others that may be important to patients' treatment decisions, such as practitioner recommendation. Therefore, we cannot determine what the main factors are for patients to add or remove diabetes medications from treatment plans. Third, the factors tested in modules 1A and 1B were described in a directional manner according to the guidelines (eg, we asked whether "expected to live a long time"

is a good reason to add a medicine to a treatment plan), and thus the participants' responses may have been affected by different beliefs of the intended effect of the factors. Fourth, our study participants, although recruited from a nationally representative online survey panel, may not be representative of certain subgroups of older adults, such as those with low health literacy. Our findings could also be susceptible to nonresponse bias. However, we achieved a relatively high response rate and used survey weights to adjust for nonresponse. Our study participants were also similar to other national studies^{14,17,47} of older adults with diabetes in terms of mean age, proportion with HbA_{1c} level less than 7.0%, and self-reported frequency of hypoglycemic symptoms. Fifth, the best-worst scaling method may be unfamiliar to participants and lead to misunderstanding of questions. However, we did not note confusion about the best-worst scaling tasks during pilot testing.

Conclusions

Individualized diabetes care is essential for older adults, yet older adults' beliefs about certain guideline factors for individualizing glycemic targets are contrary to what the guidelines recommend, and older adults may not consider these factors important in treatment deintensification. These findings may present substantial barriers to share decision-making and contribute to inappropriate treatment goals and care, especially when stopping use of a diabetes medication may be beneficial. Developing strategies to communicate the rationales promoting individualized diabetes treatment to patients and to effectively engage patients in these treatment decisions are important next steps.

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