

Supplemental Appendix: Survey Instrument

Continuous Glucose Monitoring Survey of Primary Care Clinicians

Introduction

Your input as a primary care clinician is needed for a study about how to improve care for patients with diabetes. The purpose of this study is to learn about barriers and facilitators to use of continuous glucose monitoring (or “CGM”) for primary care patients with diabetes.

1. Have you taken an online survey on the topic of continuous glucose monitoring (CGM) in the past six months?

- ☐ Yes **[SKIP LOGIC: GO TO END OF SURVEY (INELIGIBLE)]**
☐ No

2. I am clinically active (i.e. Physician, Resident, PA, or NP) in the United States.

True

False

3. Please select which of the following best describes your professional role:

- ☐ Attending, faculty, or community physician
☐ Resident **[SKIP LOGIC: Go to Q6]**
☐ Physician Assistant
☐ Nurse Practitioner
☐ Other

[DISPLAY LOGIC: SHOW Q3 IF Q2=OTHER]

[Q2 VALIDATION OPTIONS: FORCE RESPONSE]

4. Please specify “other” professional role: _____

5. What is your medical specialty?

- ☐ Family Medicine
☐ Internal Medicine
☐ General Pediatrics
☐ Internal Medicine-Pediatrics
☐ Other

[DISPLAY LOGIC: SHOW Q5 IF Q4=OTHER]

[Q5 VALIDATION OPTIONS: FORCE RESPONSE]

6. Please specify “other” medical specialty: _____

7. How many years has it been since you completed training?

- ☐ 0
- ☐ 1-5
- ☐ 6-10
- ☐ 11-15
- ☐ 16-20
- ☐ More than 20
- ☐ Not applicable

8. Which statement best describes your experience with Continuous Glucose Monitors (CGM), sometimes called “glucose sensors”?

- ☐ I have never heard of a CGM.
- ☐ I have heard of a CGM, but I have never had patients on one.
- ☐ I have had patients on a CGM, but I have never prescribed one.
- ☐ I have prescribed a CGM.

9. What sources do you rely on for information about diabetes? Select all that apply.

- ☐ American Academy of Family Physicians (AAFP)
- ☐ American Diabetes Association
- ☐ American College of Endocrinology
- ☐ American Association of Clinical Endocrinologists (AACE)
- ☐ DynaMed
- ☐ Uptodate
- ☐ American Association of Nurse Practitioners (AANP)
- ☐ American College of Physicians (ACP)
- ☐ American Association of Physician Assistants (AAPA)
- ☐ Physician Assistant Education Association (PAEA)
- ☐ Live Continuing Medical Education
- ☐ Journal articles/reviews
- ☐ Pharmaceutical industry representatives
- ☐ Device industry representatives
- ☐ Other

[DISPLAY LOGIC: SHOW Q9 IF Q8=OTHER]

[Q9 VALIDATION OPTIONS: FORCE RESPONSE]

10. Please specify “other” information source(s): _____

11. How effective are the following information channels in helping you learn?

	Not at all effective	Somewhat effective	Moderately effective	Very effective

a. Websites, training modules, or other online resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Academic journals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Conferences and meetings (e.g. live continuing medical education)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Other written communication (e.g. reports, newsletters, weekly digest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Other recorded communication (e.g., podcasts, Audio Digest)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

12. Please estimate the approximate number of patients in each of the following categories:

	0	1-5	6-10	11-20	More than 20
a. Patients with type 1 diabetes <u>you personally</u> see in your practice each month.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Patients with type 1 diabetes <u>your entire practice</u> sees each month.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Patients with type 2 diabetes who take both long-acting and short-acting insulin <u>you personally</u> see in your practice each month.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Patients with type 2 diabetes who take both long-acting and short-acting insulin <u>your entire practice</u> sees each month.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. What is your primary practice setting?

- ☐ Academic Medical Center
- ☐ Community Health Clinic
- ☐ Federally Qualified Health Center
- ☐ Private Practice
- ☐ Hospital-Owned Practice
- ☐ Free and Charitable Clinic
- ☐ Other Residency Practice not listed above
- ☐ Other

[DISPLAY LOGIC: SHOW Q13 IF Q12=OTHER]

[Q13 VALIDATION OPTIONS: FORCE RESPONSE]

14. Please specify "other" practice setting: _____

15. Approximately what percentage of your practice's patients are in each of the following payer categories?

	0	1 to 25%	26% to 50%	51% to 75%	76% to 100%
a. Medicare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Medicaid	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Private Insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. No Insurance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. What is the zip code of the practice where you most frequently see patients? _____

17. Approximately how far is your office from the nearest endocrinologist? If you have more than one clinical practice site, please answer based on the one where you see patients most frequently.

- ☐ 5 miles or less
- ☐ 6-10 miles
- ☐ 11-20 miles
- ☐ 21-40 miles
- ☐ 41-60 miles
- ☐ Greater than 60 miles

18. Does your practice have a Certified Diabetes Educator (now called a “Diabetes Care and Education Specialist”) in your office at least part-time?

- ☐ Yes
- ☐ No

19. Is there a Certified Diabetes Educator that you can refer to within 10 miles of your practice?

- ☐ Yes
- ☐ No

[DISPLAY LOGIC: SHOW Q19 IF Q18=YES]

20. Generally speaking, how often do you refer your patients with diabetes to a Certified Diabetes Educator?

- ☐ Most of the time
- ☐ Some of the time
- ☐ Rarely
- ☐ Never

21. Does your practice have any of the following resources that can help provide diabetes education in your office? Select all that apply.

- ☐ Nurse
- ☐ Care Coordinator
- ☐ Pharmacist
- ☐ Patient Navigator
- ☐ Health Coach
- ☐ Hard Copy Resources (brochures, handouts, etc.)
- ☐ Online Resources (websites, etc.)
- ☐ TV/Video
- ☐ Other

[DISPLAY LOGIC: SHOW Q21 IF Q20=OTHER]

[Q21 VALIDATION OPTIONS: FORCE RESPONSE]

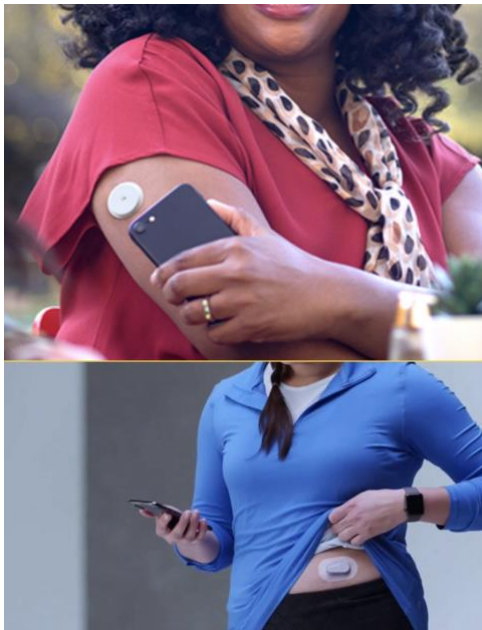
22. Please specify “other” resource(s): _____

23. Are there other diabetes education resources (e.g. nurses, care coordinators, pharmacists, patient navigators, health coaches) that you can refer to **within 10 miles** of your practice?
- ☐ Yes
 - ☐ No

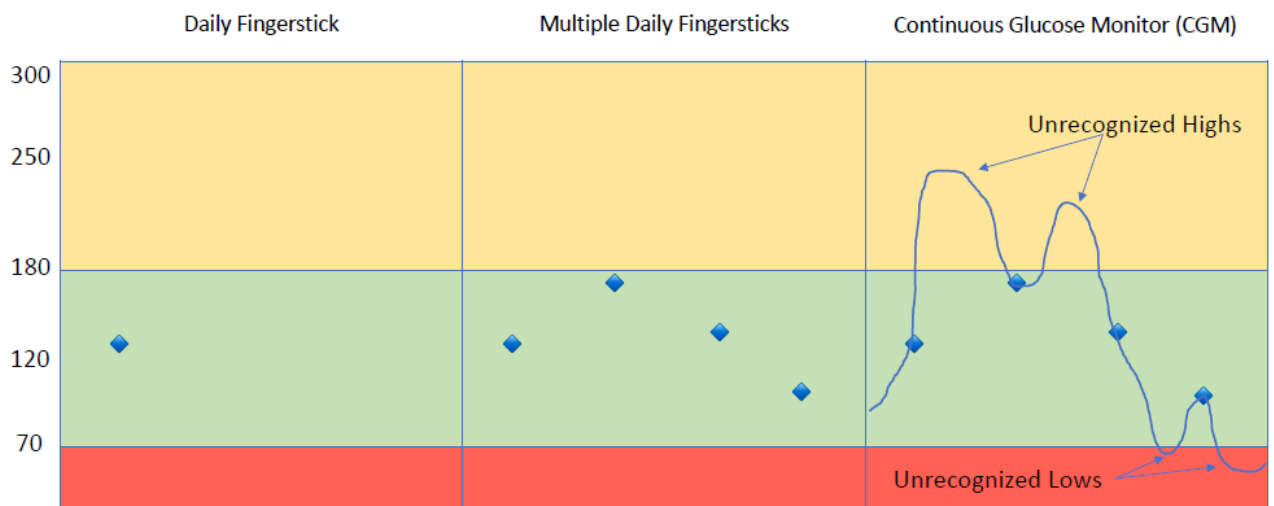
Brief Overview of Continuous Glucose Monitors

Now, we would like to provide you with some information about Continuous Glucose Monitors for diabetes management.

- Glucose sensors—often called “Continuous Glucose Monitors” or “CGMs”—help people manage their diabetes. The figures below display how a CGM is used and transmits glucose readings.



- Continuous glucose monitoring (CGM) is associated with improved outcomes for many with diabetes—especially those on intensive insulin therapy—and is now included in the American Diabetes Association Standards of Medical Care in Diabetes.
- CGM provides people with numeric and visual readings of their glucose levels, which may help with some aspects of self-management of diabetes. CGM can help primary care providers make decisions regarding care for their patients with diabetes. The figure below shows how CGM provides a comprehensive overview of blood glucose patterns, more like a movie, rather than the isolated “snapshots” offered by one or multiple daily finger sticks.



24. Reflecting on this information about CGM, how likely are you to **prescribe** CGM to your patients?

- ☐ Not at all likely
- ☐ Somewhat likely
- ☐ Moderately likely
- ☐ Very likely

[DISPLAY LOGIC: SHOW Q25 IF Q24=“Not at all likely”]

25. How likely are you to **recommend** that your patient pursue CGM through a specialist?

- ☐ Not at all likely
- ☐ Somewhat likely
- ☐ Moderately likely
- ☐ Very likely

26. How likely would you be to prescribe CGM to your patients if you had access to the following resources?

	Not at all likely	Somewhat likely	Moderately likely	Very Likely
a. Educational website about CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. One-time consult with an endocrinologist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Virtual specialty care center to refer patients for direct support	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Telementoring sessions with a specialty team	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Asynchronous e-consultations with an endocrinologist	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
f. Consultation on insurance issues that may arise	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
g. CGM education/training Workshop	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. **For patients with Type 1 diabetes**, please rate your confidence in your ability to perform the following tasks :

	Not at all confident	Somewhat confident	Moderately confident	Very confident
a. Prioritize which patients may benefit from CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Counsel patients on the benefits of CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Educate patients on how to appropriately use CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Analyze and interpret CGM data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

e. Make treatment adjustments based on CGM data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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28. For patients with Type 2 diabetes who require both long-acting and short-acting insulin, please rate your confidence in your ability to perform the following tasks:

	Not at all confident	Somewhat confident	Moderately confident	Very confident
a. Prioritize which patients may benefit from CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. Counsel patients on the benefits of CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. Educate patients on how to appropriately use CGM	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. Analyze and interpret CGM data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
e. Make treatment adjustments based on CGM data	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

29. For each of the following statements, please select true or false:

	TRUE	FALSE
a. I refer all adult patients with type 1 diabetes to an endocrinologist	<input type="radio"/>	<input type="radio"/>
b. I refer adult patients with type 1 diabetes to an endocrinologist only when their diabetes is difficult to manage	<input type="radio"/>	<input type="radio"/>
c. I refer all adult patients with type 2 diabetes who take both long-acting and short-acting insulin to an endocrinologist	<input type="radio"/>	<input type="radio"/>
d. I refer all adult patients with type 2 diabetes who take both long-acting and short-acting insulin to an endocrinologist only when their diabetes is difficult to manage	<input type="radio"/>	<input type="radio"/>
e. I refer all children with type 1 diabetes to an endocrinologist	<input type="radio"/>	<input type="radio"/>
f. I refer children with type 1 diabetes to an endocrinologist only when their diabetes is difficult to manage	<input type="radio"/>	<input type="radio"/>

30. Have you experienced any challenges when trying to refer patients with **type 1 diabetes** to endocrinology?

- ☐ Yes
- ☐ No **[SKIP LOGIC: Go to Q32]**

31. Which of the following problems have you experienced when trying to refer patients with **type 1 diabetes** to endocrinology? (Select all that apply).

- ☐ Lack of adult endocrinologists in my geographic area
- ☐ Lack of pediatric endocrinologists in my geographic area
- ☐ Lack of endocrinologists who participate with our patients' insurance
- ☐ Long wait times when trying to schedule our patients with endocrinologists
- ☐ Other

[DISPLAY LOGIC: SHOW Q31 IF Q30=OTHER]

[Q31 VALIDATION OPTIONS: FORCE RESPONSE]

32. Please specify "other" problem(s): _____

33. Which of the following reasons describes why an **adult with type 1 diabetes** may benefit from receiving their diabetes-related treatment at your primary care practice rather than through a specialist like an endocrinologist? (Select all that apply).

- ☐ Primary care clinicians can fully care for patients with type 1 diabetes in our offices so there is no need for them to see an endocrinologist
- ☐ It is more convenient for patients with type 1 diabetes to receive their diabetes-related care with their primary care clinician
- ☐ My patients are unable and/or unwilling to travel to see an endocrinologist
- ☐ My patients are not interested in going to see endocrinologists for care
- ☐ The wait times for my patients to receive diabetes care prohibit my patients with type 1 diabetes from being able to routinely follow with an endocrinologist
- ☐ Other

[DISPLAY LOGIC: SHOW Q33 IF Q32=OTHER]

[Q33 VALIDATION OPTIONS: FORCE RESPONSE]

34. Please specify "other" reason(s): _____

35. Which of the following reasons describes why a **child with type 1 diabetes** may benefit from receiving their diabetes-related treatment at your primary care practice rather than through a specialist like an endocrinologist? (Select all that apply).

- ☐ Primary care clinicians can fully care for patients with type 1 diabetes in our offices so there is no need for them to see an endocrinologist
- ☐ It is more convenient for patients with type 1 diabetes to receive their diabetes-related care with their primary care clinician
- ☐ My patients are unable and/or unwilling to travel to see an endocrinologist
- ☐ My patients are not interested in going to see endocrinologists for care
- ☐ The wait times for my patients to receive diabetes care prohibit my patients with type 1 diabetes from being able to routinely follow with an endocrinologist
- ☐ Other

[DISPLAY LOGIC: SHOW Q35 IF Q34=OTHER]

[Q35 VALIDATION OPTIONS: FORCE RESPONSE]

36. Please specify "other" reason(s): _____

37. Have you experienced any challenges when trying to refer patients with **type 2 diabetes who take both long-acting and short-acting insulin** to endocrinology?

- ☐ Yes
- ☐ No [SKIP LOGIC: Go to Q39]

38. Which of the following have you experienced when trying to refer patients with **type 2 diabetes who take both long-acting and short-acting insulin** to endocrinology? (Select all that apply).

- ☐ Lack of adult endocrinologists in my geographic area
- ☐ Lack of pediatric endocrinologists in my geographic area
- ☐ Lack of endocrinologists who participate with our patients' insurance
- ☐ Long wait times when trying to schedule our patients with endocrinologists
- ☐ Other

[DISPLAY LOGIC: SHOW Q38 IF Q37=OTHER]

[Q38 VALIDATION OPTIONS: FORCE RESPONSE]

39. Please specify "other" experience(s): _____

40. Which of the following reasons describes why a patient with **type 2 diabetes who takes both long-acting and short-acting insulin** may prefer to receive their diabetes-related treatment at your primary care practice rather than through a specialist like an endocrinologist? (Select all that apply).

- ☐ Primary care physicians can fully care for patients with type 2 diabetes in our offices so there is no need for them to see an endocrinologist
- ☐ It is more convenient for patients with type 2 diabetes to receive their diabetes-related care with their primary care provider
- ☐ My patients are unable and/or unwilling to travel to see an endocrinologist
- ☐ My patients are not interested in going to see endocrinologists for care
- ☐ The wait times for my patients to receive diabetes care prohibit my patients with insulin requiring type 2 diabetes from being able to routinely follow with an endocrinologist
- ☐ Other

[DISPLAY LOGIC: SHOW Q40 IF Q39=OTHER]

[Q40 VALIDATION OPTIONS: FORCE RESPONSE]

41. Please specify "other" reason(s): _____

42. Please provide your email address so that we may send your gift card to thank you for participating in this survey:

43. Would it be OK if we contacted you for a brief follow-up interview? We would anticipate the interview to take up to 30 minutes and you would receive \$50 as additional compensation for your time.

- ☐ Yes
- ☐ No **[SKIP LOGIC: Go to end of survey]**

44. Please provide your email address to be contacted for a follow-up interview:

Thank you for completing this survey.

Supplemental Table 1. Respondent and Practice Characteristics associated with Confidence Using CGM to Manage Type 1 and Type 2 Diabetes

	Confidence Managing Type 1 Diabetes ¹		Confidence Managing Type 2 Diabetes ¹	
	Coef (SE)	<i>p</i>	Coef (SE)	<i>p</i>
Previously Prescribed CGM	3.39 (.33)	<.001	3.38 (.33)	<.001
% Time Primary Care 75% or more Less than 75%	--- ---	---	Ref. 0.64 (.38)	.09
Years Since Training 0 1 to 5 6 to 15 16 or more	.05 (.54) -1.13 (.49) -.32 (.42) Ref.	.06	-.01 (.56) -1.31 (.49) -.08 (.43) Ref.	.01
% Medicare 25% or less 26% to 50% >50%	Ref .71 (.35) 1.48 (.48)	<.01	Ref 0.47 (.35) 1.43 (.47)	<.01
¹ n=546 in final models, r-square for model for T1DM=0.1894; r-square for model for T2DM=0.2064. Respondent role, primary setting, full- or part-time employment, distance from endocrinologist, percent of patients who use Medicaid, percent of patients who use private insurance, and percent of patients with no insurance did not meet threshold for inclusion in either final model. Percent of professional time spent delivering primary care did not meet threshold for inclusion in final model for T1DM.				

Supplemental Table 2. Likelihood to Prescribe CGM with Access to Various Resources, Sources Used for Information about Diabetes, and Effectiveness of Information Channels

	Selected (%)				Total
<i>Sources used for information about diabetes</i>					632
American Association of Family Physicians	91.6				
Uptodate	80.4				
American Diabetes Association	68.4				
Continuing Medical Education	59.3				
Journals	40.5				
American College of Endocrinology	23.1				
American Association of Clinical Endocrinologists	16.9				
American College of Physicians	9.2				
DynaMed	9.0				
American Association of Diabetes Educators	4.0				
American Association of Nurse Practitioners	3.3				
American Association of Physician Assistants	1.7				
Pharmaceutical industry representatives	0.8				
Device industry representatives	0.6				
Other	4.0				
	Not at all effective	Somewhat effective	Moderately effective	Very effective	Total
<i>Effectiveness of Information Channels</i>					
Websites, training modules, or other online resources	1.3	24.0	44.1	30.6	617
Academic journals	2.8	32.1	47.4	17.7	616
Conferences and meetings	0.8	14.4	36.7	48.0	616
Other written communication (e.g., reports, newsletters, weekly digest)	7.6	42.2	40.9	9.3	614
Other recorded communication (e.g., podcasts, Audio Digest)	16.3	37.5	33.2	13.0	614

Supplemental Table 3. Behavior and Perceptions Related to CGM Use and Referral of Patients with Diabetes

Survey Item	%	n
<i>Likelihood to Recommend Pursuing CGM through Specialist</i>		602
Not at all likely	9.5	57
Somewhat likely	31.7	191
Moderately likely	31.2	188
Very likely	27.6	166
<i>Frequency of Referring Diabetes Patients to Diabetes Care and Education Specialist</i>		614
Most of the time	32.9	202
Some of the time	44.0	270
Rarely	19.1	117
Never	4.1	25
<i>Endocrinology Referral Practices</i>		
I refer all adult patients with type 1 diabetes to an endocrinologist	49.1	292
I refer adult patients with type 1 diabetes to an endocrinologist only when their diabetes is difficult to manage	59.7	355
I refer all adult patients with type 2 diabetes who take both long-acting and short-acting insulin to an endocrinologist	5.0	30
I refer all adult patients with type 2 diabetes who take both long-acting and short-acting insulin to an endocrinologist only when their diabetes is difficult to manage	75.4	447
I refer all children with type 1 diabetes to an endocrinologist	89.2	529
I refer children with type 1 diabetes to an endocrinologist only when their diabetes is difficult to manage	42.0	249
<i>Experienced challenges trying to refer patients with type 1 diabetes to endocrinology</i>		
Yes	41.4	245
No	58.6	347
<i>Challenges in trying to refer patients with type 1 diabetes to endocrinology (among those who reported any)</i>		
Long wait times when trying to schedule our patients with endocrinologists	74.7	183
Lack of adult endocrinologists in my geographic area	64.9	159
Lack of pediatric endocrinologists in my geographic area	55.5	136
Lack of endocrinologists who participate with our patients' insurance	44.1	108
<i>Experienced challenges trying to refer patients with type 2 diabetes who take both long- and short-acting insulin to endocrinology</i>		
Yes	45.4	265

No	54.6	319
<i>Challenges in trying to refer patients with type 2 diabetes who take both long- and short-acting insulin to endocrinology (among those who reported any)</i>		
Long wait times when trying to schedule our patients with endocrinologists	79.2	210
Lack of adult endocrinologists in my geographic area	55.9	148
Lack of endocrinologists who participate with our patients' insurance	47.9	127
Lack of pediatric endocrinologists in my geographic area	17.7	47
<i>Reasons why an adult with type 1 diabetes may benefit from receiving diabetes-related treatment in primary care rather than a specialist</i>		656
Primary care clinicians can fully care for patients with type 1 diabetes	28.0	184
It is more convenient	66.2	434
My patients are unable and/or unwilling to travel to see an endocrinologist	47.6	312
My patients are not interested in going to see endocrinologists for care	23.6	155
Wait times are prohibitive	45.9	301
<i>Reasons why a child with type 1 diabetes may benefit from receiving diabetes-related treatment in primary care rather than a specialist</i>		656
Primary care clinicians can fully care for patients with type 1 diabetes	1.7	11
It is more convenient	48.6	319
My patients are unable and/or unwilling to travel to see an endocrinologist	30.6	201
My patients are not interested in going to see endocrinologists for care	11.6	76
Wait times are prohibitive	35.8	235
<i>Reasons why a patient with type 2 diabetes who takes both long- and short-acting insulin may benefit from receiving diabetes-related treatment in primary care rather than a specialist</i>		656
Primary care clinicians can fully care for patients with type 1 diabetes	57.2	375
It is more convenient	72.3	474
My patients are unable and/or unwilling to travel to see an endocrinologist	49.5	325
My patients are not interested in going to see endocrinologists for care	38.6	253
Wait times are prohibitive	44.2	290