



# Health Care Transition in Young Adults With Type 1 Diabetes: Perspectives of Adult Endocrinologists in the U.S.

*Diabetes Care* 2016;39:190–197 | DOI: 10.2337/dc15-1775

Katharine C. Garvey,<sup>1</sup> Gabriela H. Telo,<sup>2</sup>  
Joseph S. Needleman,<sup>2</sup> Peter Forbes,<sup>3</sup>  
Jonathan A. Finkelstein,<sup>4,5</sup> and  
Lori M. Laffel<sup>1,2</sup>

## OBJECTIVE

Young adults with type 1 diabetes transitioning from pediatric to adult care are at risk for adverse outcomes. Our objective was to describe experiences, resources, and barriers reported by a national sample of adult endocrinologists receiving and caring for young adults with type 1 diabetes.

## RESEARCH DESIGN AND METHODS

We fielded an electronic survey to adult endocrinologists with a valid e-mail address identified through the American Medical Association Physician Masterfile.

## RESULTS

We received responses from 536 of 4,214 endocrinologists (response rate 13%); 418 surveys met the eligibility criteria. Respondents (57% male, 79% Caucasian) represented 47 states; 64% had been practicing >10 years and 42% worked at an academic center. Only 36% of respondents reported often/always reviewing pediatric records and 11% reported receiving summaries for transitioning young adults with type 1 diabetes, although >70% felt that these activities were important for patient care. While most respondents reported easy access to diabetes educators (94%) and dietitians (95%), fewer (42%) reported access to mental health professionals, especially in nonacademic settings. Controlling for practice setting and experience, endocrinologists without easy access to mental health professionals were more likely to report barriers to diabetes management for young adults with depression (odds ratio [OR] 5.3; 95% CI 3.4, 8.2), substance abuse (OR 3.5; 95% CI 2.2, 5.6), and eating disorders (OR 2.5; 95% CI 1.6, 3.8).

## CONCLUSIONS

Our findings underscore the need for enhanced information transfer between pediatric and adult providers and increased mental health referral access for young adults with diabetes post-transition.

The young adult period presents special challenges for patients with type 1 diabetes, a chronic illness that requires intensive daily self-management and close medical follow-up (1,2). As young adults with type 1 diabetes experience competing life priorities and decreasing parental involvement in diabetes care, treatment adherence and glycemic control may decline. Young adults with type 1 diabetes,

<sup>1</sup>Division of Endocrinology, Boston Children's Hospital, Boston, MA

<sup>2</sup>Pediatric, Adolescent and Young Adult Section, Joslin Diabetes Center, Boston, MA

<sup>3</sup>Clinical Research Program, Boston Children's Hospital, Boston, MA

<sup>4</sup>Division of General Pediatrics, Boston Children's Hospital, Boston, MA

<sup>5</sup>Department of Population Medicine, Harvard Pilgrim Health Care Institute, Boston, MA

Corresponding author: Katharine C. Garvey, [katharine.garvey@childrens.harvard.edu](mailto:katharine.garvey@childrens.harvard.edu).

Received 13 August 2015 and accepted 27 October 2015.

© 2016 by the American Diabetes Association. Readers may use this article as long as the work is properly cited, the use is educational and not for profit, and the work is not altered.

like adolescents (3), have been shown to be at risk for poor glycemic control and adverse health outcomes, including acute diabetes complications such as ketoacidosis and severe hypoglycemia, chronic microvascular complications, and early mortality (4–10).

Health care transition has been defined as “the planned, purposeful movement of young adults from child-centered to adult-oriented health-care systems” (11). There is broad consensus that a lack of effective transition from pediatric to adult diabetes care may contribute to fragmentation of health care, decreased frequency of clinical follow-up, and increased risk for adverse outcomes in young adults with type 1 diabetes (2,12).

Empiric data are limited on best practices in transition care, especially in the U.S. (10,13–16). Prior research, largely from the patient perspective, has highlighted challenges in the transition process, including gaps in care (13,17–19); suboptimal pediatric transition preparation (13,20); increased post-transition hospitalizations (21); and patient dissatisfaction with the transition experience (13,17–19). Previous studies (22–24) have also identified differences between pediatric and adult diabetes care environments as perceived by patients, including, for example, an increased focus on the family in the pediatric setting and an increased focus on diabetes complications in the adult setting.

To advance improvements in care, the national landscape of health care transition and post-transition care for young adults with type 1 diabetes requires greater understanding of the barriers, especially with respect to receiving physician perspectives. Available data suggest that adult endocrinologists care for many young adults with type 1 diabetes following their transfer from pediatric endocrinologists. Among a cohort of participants  $\geq 18$  years old in the SEARCH for Diabetes in Youth Quality-of-Care Survey sample, 45% received care from an adult endocrinology care provider, compared with 17% from a generalist (25). However, in order to identify the best practices to enhance the transition process, it is critically important to evaluate the experiences of the adult endocrinologists accepting these transitioning young adult patients with type 1 diabetes.

The objectives of this study were to describe experiences reported by a national sample of adult endocrinologists caring for young adults with type 1 diabetes transferring from pediatric to adult diabetes care and to assess the clinical resources and barriers to care for young adults with type 1 diabetes reported by adult endocrinologists.

## RESEARCH DESIGN AND METHODS

### Survey Development

We developed a structured survey to characterize the clinical experiences, resources, and barriers reported by adult endocrinologists caring for young adults with type 1 diabetes. Academic literature review, patient survey results, and pediatric and adult provider interviews guided survey development. Initial revisions were made following individual and group feedback from pediatric and adult diabetes providers. The survey was then administered to a small convenience sample of eight endocrinologists for cognitive testing prior to final revisions.

The final survey included 60 items and required  $\sim 10$  min for completion. The survey was divided into the following domains: 1) practice characteristics, 2) physician demographics, 3) health care transition components and their perceived importance, and 4) description of diabetes care provided for young adults, including resources, barriers, and recommendations for improvement. The survey ended with an optional open-ended question asking whether respondents wanted to share anything else regarding experiences caring for young adults with diabetes. A secure electronic version of the survey was created using Research Data Electronic Capture, or REDCap (26), hosted by the Joslin Diabetes Center in conjunction with user support from Harvard Catalyst. A copy of the survey is available upon reader request to the corresponding author. This study was approved by the Committee on Human Studies at the Joslin Diabetes Center, Boston, MA.

### Description of Key Survey Variables

For assessment of components of transition care, the survey asked: “In your experience, how often do the following occur when patients with type 1 diabetes are transitioning to you from pediatric care?” Components included receipt of patient summary, review of pediatric

records, communication with pediatric providers, parent involvement in first adult visit, combined pediatric/adult diabetes visit, and participation in a transition program. Response options included the following: never, rarely, sometimes, often, or always. Respondents then indicated the perceived importance of each component, with the following response options: not at all important, somewhat important, important, or very important.

To evaluate clinical resources, the survey asked respondents to first indicate resources to which they had easy access (diabetes educator, dietitian, mental health provider, exercise physiologist, care coordinator, and interpreter) and then to specify resources to which they still needed additional access to care effectively for young adults with diabetes.

For the assessment of barriers, the survey presented a series of clinical scenarios involving a 22-year-old patient with type 1 diabetes. Several scenarios focused on mental health topics (e.g., clinical depression, eating disorder, alcohol/drug abuse, severe fear of hypoglycemia, and developmental disability), while others focused on medical management (continuous glucose monitoring, elite athlete, obesity, and poor glycemic control with recurrent ketoacidosis). For each scenario, we asked respondents to describe the barriers to clinical diabetes management; response options included the following: 1) requires too much additional time, 2) inadequate clinical resources, 3) lack clinical expertise in this, 4) other, 5) none.

### Survey Administration

Eligible subjects included physicians with a valid e-mail address with specialty listed as “Endocrinology” or “Diabetes” in the American Medical Association (AMA) Physician Masterfile, excluding trainees or physicians with pediatrics or pediatric endocrinology listed as the primary specialty. The AMA Physician Masterfile is a record of current and past data from physicians in the U.S. A physician’s profile is created upon entrance to medical school and is updated with information collected from board certification and state licensure programs, annual AMA census surveys, and an annual online profile update.

We sent an electronic survey to eligible physicians in four waves between July and September 2012. Responses were anonymous. For respondents to proceed with the survey, they had to report caring for five or more young adults with type 1 diabetes, and for inclusion in analyses, respondents had to complete all items related to health care transition. Subjects were offered a choice of a \$10 donation to either the American Diabetes Association or JDRF upon survey completion.

### Statistical Analysis

All statistical analyses were conducted using SAS version 9.2 (SAS Institute Inc., Cary, NC). Descriptive statistics were presented as the mean and SD or proportions.  $\chi^2$  tests evaluated associations of practice (academic setting, yes/no) and physician (>10 years of experience, yes/no) characteristics with reported components of transition and clinical resources. Because of multiple comparisons across survey questions, a *P* value of <0.01 was used as the threshold for statistical significance. Following the recognition that mental health services were the only desired clinical resource that was unavailable to >50% of respondents, additional analyses explored factors associated with the absence of mental health services. For the clinical scenarios created to assess barriers, multivariable logistic regression (controlling for years of physician experience and practice setting) provided the odds (with 95% CI) of endorsing barriers in each specific scenario (e.g., depression) according to reported lack of mental health resources.

### Open-Ended Response Analysis

Thematic analysis was undertaken of the responses to the open-ended question inviting further input from respondents about their experiences caring for young adults with type 1 diabetes. This analysis was iteratively conducted by three members of the research team (K.C.G., G.H.T., and L.M.L.). The team members independently read all free-text comments and marked and categorized key words and phrases to generate initial codes. Codes were organized using Microsoft Excel. Initial codes were discussed by the group, and discrepancies were resolved through consensus on each comment, ultimately generating a list of second-cycle codes. Each team member then applied the revised coding framework to all free-text

comments, and the team met to reach consensus on six final themes.

## RESULTS

### Survey Response

A total of 6,398 physicians in the non-territorial U.S. were listed in the AMA Physician Masterfile in July 2012 with Endocrinology or Diabetes as the primary specialty (excluding trainees or pediatric physicians). For comparison, the American Board of Internal Medicine recorded 6,384 valid nonterritorial certifications in Endocrinology, Diabetes, and Metabolism as of February 2013 ([www.abim.org](http://www.abim.org)). We sent the electronic survey to the 4,275 eligible physicians with an available

e-mail address. Of these, 4,215 surveys were successfully delivered.

We received 536 responses (13% response rate). Of these, 29 surveys were minimally complete (according to predetermined criteria), 64 physicians sent messages to report their ineligibility (e.g., geriatric providers or working in industry), and 25 physicians cared for fewer than five young adults with diabetes. In sum, 418 surveys were analyzed.

### Sample Characteristics

Table 1 displays respondent and practice characteristics. The majority of endocrinologists responding to the survey were male (57%), Caucasian (79%), >45

**Table 1—Sample characteristics (n = 418)**

Characteristic	Item N	Mean $\pm$ SD or %
Male	400	57
Race	403	
White/Caucasian		79
Black/African American		1
Asian/Pacific Islander		17
Other		3
Age	405	
$\leq$ 45 years		41
46–64 years		48
$\geq$ 65 years		11
Years in practice	404	
$\leq$ 10 years		37
11–20 years		28
$\geq$ 21 years		35
U.S. Census region of practice	403	
Northeast		30
South		30
Midwest		23
West		17
Practice setting	416	
Urban		51
Suburban		40
Rural		9
Practice type	415	
Academic medical center		42
Community hospital		9
Large group practice		27
Small group practice		12
Solo practice		10
Patient panel with type 1 diabetes, mean $\pm$ SD	413	22 $\pm$ 17
Patient panel with type 2 diabetes, mean $\pm$ SD	393	54 $\pm$ 22
Number of patients with type 1 diabetes 18–30 years of age in physician panel	415	
5–25		40
26–50		29
51–100		17
>100		14
Report of typical diabetes return visit length	404	
$\leq$ 15 min		22
20 min		39
25–30 min		36
>30 min		3

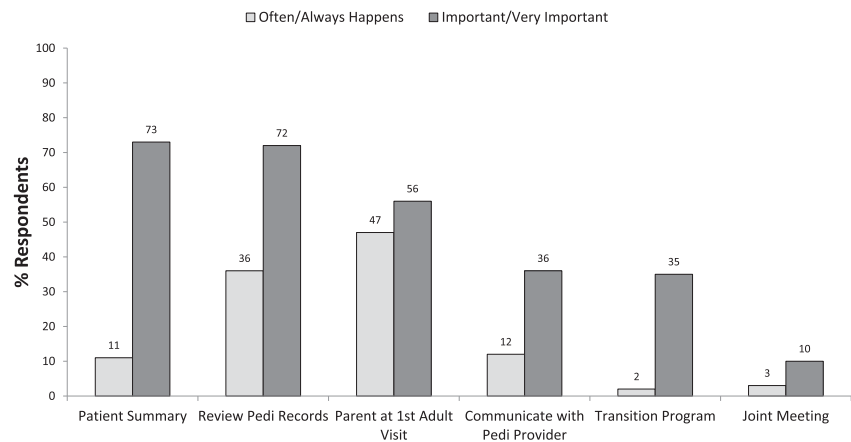
years old (59%) and had been practicing adult endocrinology/diabetes for >10 years (64%). Sex and age comparison data are available from a recent Endocrine Society analysis (27) of data from the 2011 AMA Physician Masterfile, in which 62% of endocrinologists were male and the mean age was 51 years. Half of the respondents worked in an urban setting, and 42% worked at an academic medical center. A total of 46 states plus the District of Columbia were represented in the sample; only Idaho, Nebraska, South Dakota, and Wyoming were not represented. Examining responses by U.S. Census region, 30% of respondents practiced in the Northeast, 30% in the South, 23% in the Midwest, and 17% in the West. On the basis of the regional breakdown of American Board of Internal Medicine endocrinology certifications as of February 2013, the sample represented between 5.5% and 7.5% of endocrinologists for each of the four census regions ([www.abim.org](http://www.abim.org)).

#### Transition Referral Practices

Endocrinologists reported multiple referral sources for young adults with type 1 diabetes entering their practice. Referral sources often/always generating new patients in this population included referral by pediatric providers (43%), referral by family or friend (40%), self-referred (28%), referred by health insurance (11%) or student health (9%), or other (10%).

#### Components of Transition Care

Figure 1 shows the proportion of respondents reporting an occurrence of health care transition components (often/always) for young adults with type 1 diabetes entering their practices. None of these components was endorsed as often/always occurring by more than half of respondents. Having the patient's parent at the first adult visit was most commonly endorsed (47%), and approximately one-third of respondents endorsed having the opportunity to review pediatric records (36%). Very few endocrinologists reported receiving patient summaries, direct communication with pediatric providers, joint pediatric-adult provider visits, or patient participation in a transition program (all  $\leq 12\%$ ). While occurring infrequently, half of the transition components were nonetheless rated as important/very important by the majority of respondents, including patient



**Figure 1**—Health care transition components: reported occurrence in practice and perceived importance. Pedi, pediatric.

summary (73%), pediatric record review (72%), and parent presence at the first visit (56%). One-third of respondents rated direct communication with pediatric providers and transition programs as important/very important, while only 10% endorsed the importance of a joint pediatric-adult provider visit.

$\chi^2$  comparisons showed no significant differences in occurrence of transition care components for endocrinologists with >10 years of experience or those practicing in academic settings.

#### Clinical Resources for Young Adult Diabetes Care

Figure 2 depicts the availability of clinical resources for young adult diabetes care and reports the need for additional access; availability of and need for additional access were not mutually exclusive. Most endocrinologists reported easy access to diabetes educators (94%), dietitians (95%), and interpreter services (61%). Fewer (42%) reported access to mental health providers (e.g., social worker, psychologist, or psychiatrist). Endocrinologists who reported easy access to mental health referrals for young adults with type 1 diabetes were more likely to practice at academic medical centers (52% vs. 35%,  $P = 0.0006$ ). Very few endocrinologists reported easy access to care coordinators (15%) or exercise physiologists (16%). Regarding the need for additional resources, mental health (54%) was the only need endorsed by the majority of respondents.

#### Barriers to Clinical Management of Young Adults With Diabetes

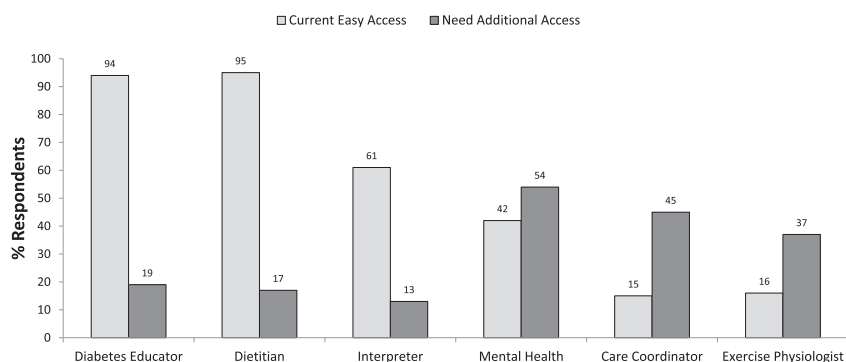
In nine patient scenarios focusing on barriers to clinical diabetes management,

specific barrier options included inadequate clinical resources, lack of clinical expertise, and too much additional time required. Of these, the resource barriers were the most highly endorsed, especially for the scenarios involving mental health issues, including substance abuse (47% endorsed the lack of resources barrier), eating disorder (39%), depression (38%), and developmental disability (31%). Resource barriers were less frequently endorsed (10–16%) for scenarios focused on medical management or technology. Similarly, for the mental health scenarios, 30% of endocrinologists endorsed lack of expertise as a barrier for substance and eating disorder cases (both 30%), followed by developmental disability (24%) and depression (15%), in contrast to minimal expertise barriers (1–3%) for recurrent ketoacidosis, obesity, and continuous glucose monitoring. Figure 3 summarizes the report of resource and expertise barriers.

In general, time barriers were less frequently selected. Time barriers were endorsed by 24% of respondents for developmental disability; by 11–13% of respondents for substance abuse, eating disorders, depression, continuous glucose monitoring, recurrent ketoacidosis, and elite athlete; by 9% for fear of hypoglycemia; and by 7% for obesity.

Logistic regression models calculated the odds of endorsing barriers for each specific scenario according to reported lack of mental health resources, controlling for physician experience and practice setting. All model  $P$  values (likelihood ratio test) were  $<0.0001$ . Endocrinologists without easy access to mental health referrals were most likely to report





**Figure 2**—Clinical resources for young adult type 1 diabetes care: reported availability and recognition of need.

barriers to diabetes management for young adults with depression (odds ratio [OR] 5.3; 95% CI 3.4, 8.2), substance abuse (OR 3.5; 95% CI 2.2, 5.6), and eating disorders (OR 2.5; 95% CI 1.6, 3.8). In addition, endocrinologists without easy access to mental health referrals were also more likely to report barriers to management for fear of hypoglycemia (OR 2.5; 95% CI 1.4, 4.4) and developmental disability (OR 2.3; 95% CI 1.5, 3.6). Barriers to management for all other scenarios were not significantly increased in endocrinologists without easy access to mental health referrals.

**Overall Perceptions and Suggestions for Improvement in Young Adult Diabetes Care**

Overall, 75% of endocrinologists reported that they enjoyed seeing young adults with type 1 diabetes (agree/strongly agree), and 56% endorsed wanting to see more young adults with type 1 diabetes in their practice. About half felt that treating young adults

with type 1 diabetes required more time (45%) and more resources (45%) compared with older adults with type 1 diabetes. To foster improvements in young adult diabetes care, respondents recommended patient support groups (82% helpful/very helpful), improved reimbursement rates (76%), online provider resources about young adult diabetes management (60%), and continuing medical education about young adult behavioral issues (57%).

**Open-Ended Response Analysis Results**

A total of 153 of 418 of the respondents (37%) provided comments to the open-ended question inviting further input regarding their experiences caring for young adults with type 1 diabetes. During the coding process, the team reached consensus on six final themes. More than 80% of narrative comment codes were encompassed by the following three themes: 1) *intensive time and care*

*coordination requirements of young adults with type 1 diabetes* (36%); adult endocrinologists endorsed a need for increased time to spend with young adults as well as a need for increased resources to address young adult social, emotional, and family issues; 2) *challenges with nonadherence among young adults with type 1 diabetes* (30%); adult endocrinologists frequently cited competing priorities of young adults and their lack of acceptance of the potential severity of type 1 diabetes as major barriers to adherence; and 3) *divergent approaches to care by pediatric and adult diabetes providers* (18%); adult endocrinologists perceived “coddling” and “excessive” focus by pediatric endocrinologists on avoidance of hypoglycemia at the expense of glycemic control). Table 2 includes representative quotations from each of these three central themes, encompassing 84% of the comments.

The remaining narrative comment thematic categories included *financial aspects of young adult diabetes care* (7%), *the role of family and social support in young adult diabetes care* (6%), and (6) *other/miscellaneous comments* (3%).

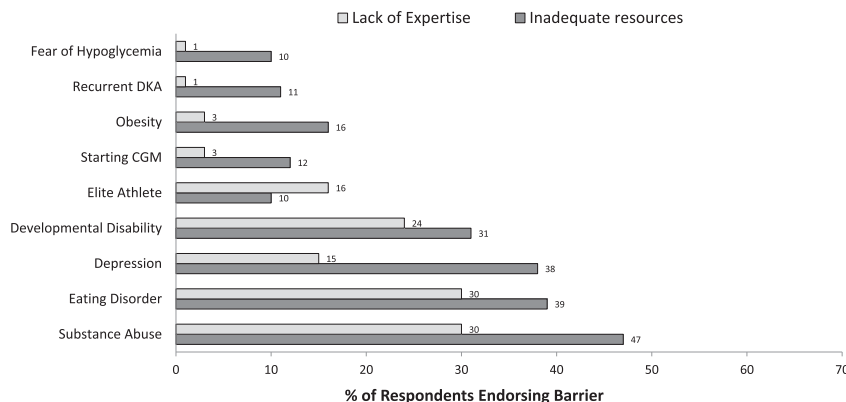
**CONCLUSIONS**

To our knowledge, this is the largest study to date examining the experiences of adult endocrinologists caring for transitioning young adults with type 1 diabetes in the U.S.

Results from our sample, representing 418 adult endocrinologists practicing in 47 states, underscore a number of major challenges in the health care transition process.

Only one-third of adult endocrinologists reported the opportunity to review pediatric records of young adults entering their practice, although three-quarters felt that it was important to do so. A minority (<15%) described direct communication (e.g., e-mail or phone) with pediatric diabetes providers or the receipt of a formal transition medical summary. Further, adult endocrinologists in our sample noted that a majority of young adult patients with type 1 diabetes appeared without any physician referral.

These findings of deficiencies in transition care coordination reinforce results from young adult patient (13,20)



**Figure 3**—Common clinical challenges facing endocrinologists caring for young adults with type 1 diabetes: perceived lack of expertise and need for more resources. CGM, continuous glucose monitoring; DKA, diabetic ketoacidosis.

**Table 2—Representative quotations from thematic analysis of narrative comments**

	Quotations
Intensive time and care coordination requirements of young adults with type 1 diabetes	<p>"I always plan on running behind with this group."</p> <p>"I often spend more time on social issues than actual medical decision-making."</p> <p>"It takes a great deal of time. . . I wish I had more resources to deal with the transition of adolescents/young adults to the adult endo clinic."</p> <p>"Very time-consuming and intense, requires coordination of care, family interaction and involvement, utilizes many resources."</p>
Challenges with nonadherence among young adults with type 1 diabetes	<p>"I find it frustrating at times because they do not yet realize the potential severity of their disease. They no-show for appointments at much higher rate than other adult patients."</p> <p>"Young adults are generally noncompliant and don't take their diagnoses seriously. There are very few young adults I see that are motivated to care about their disease. This is the biggest challenge."</p> <p>"They fall in two camps...very committed to their care, in which taking care of them is easy, and very negligent/irresponsible when it comes to managing diabetes...in which case I don't know how to help them."</p> <p>"Young adults with type 1 diabetes have many competing demands which puts their diabetes care last on their priorities. . . many are unprepared about the differences between pediatric and adult care or even how to function as an independent young adult with type 1 diabetes."</p>
Divergent approaches to care by pediatric and adult diabetes providers	<p>"Almost none of these young adults arrive in my office with the ability to care for their diabetes on their own. I have a sense that they learned nothing from their pediatric endocrinologists or they were taught nothing."</p> <p>"Generally ill-prepared to face responsibilities as adult diabetic patient. Are coddled too long by parents and pediatric practices. Adult practices in non-academic environments cannot 'hold hands.' These young adults are not trained to be accountable for their actions and have difficulty transitioning to adult care."</p> <p>"Overall I've been underwhelmed by pediatric endocrinologists from what the patients transitioning to me tell me. It seems that A1Cs are not stressed and avoidance of hypoglycemia is stressed excessively. . . I then get patients that are developing complications in their mid-20's."</p> <p>"Patients transitioning from peds have been conditioned to think an A1C of 8 is OK. Then the adult endo becomes the bad news doctor, making the transition worse."</p>

and pediatric provider (28) surveys showing suboptimal transition planning. Joint expert consensus guidelines from the American Academy of Pediatrics, American Academy of Family Physicians, and the American College of Physicians state the importance of medical record review by the receiving adult provider as well as direct communication between pediatric and adult providers (29). A position statement of the American Diabetes Association, in collaboration with many professional societies, emphasizes the value of a pediatric care summary document, with recommended

components including assessment of diabetes self-care skills, summary of past glycemic control and diabetes-related comorbidities, and summary of mental health issues (2). The Endocrine Society has created materials to help ease this transition process, including a comprehensive care summary template (30). Nonetheless, the gaps between national consensus recommendations and current physician practices, as demonstrated in our study, support the need for additional collaborative efforts at individual, practice, and systems levels to enhance provider hand-offs for

transitioning young adults with type 1 diabetes.

A number of studies document deficiencies in provider hand-offs across other chronic conditions and point to the broader relevance of our findings. For example, in two studies of inflammatory bowel disease, adult gastroenterologists reported inadequacies in young adult transition preparation (31) and infrequent receipt of medical histories from pediatric providers (32). In a study of adult specialists caring for young adults with a variety of chronic diseases (33), more than half reported

that they had no contact with the pediatric specialists.

Importantly, more than half of the endocrinologists in our study reported a need for increased access to mental health referrals for young adult patients with type 1 diabetes, particularly in non-academic settings. Report of barriers to care was highest for patient scenarios involving mental health issues, and endocrinologists without easy access to mental health referrals were significantly more likely to report barriers to diabetes management for young adults with psychiatric comorbidities such as depression, substance abuse, and eating disorders.

Prior research (34,35) has uncovered the lack of mental health resources in diabetes care. In the large cross-national Diabetes Attitudes, Wishes and Needs (DAWN) study (36), which was not specific to type 1 diabetes or young adults, diabetes providers often reported not having the resources to manage mental health problems; half of specialist diabetes physicians felt unable to provide psychiatric support for patients and one-third did not have ready access to outside expertise in emotional or psychiatric matters. Our results, which resonate with the DAWN findings, are particularly concerning in light of the vulnerability of young adults with type 1 diabetes for adverse medical and mental health outcomes (4,34,37,38).

In a recent report from the Mental Health Issues of Diabetes conference (35), which focused on type 1 diabetes, a major observation included the lack of trained mental health professionals, both in academic centers and the community, who are knowledgeable about the mental health issues germane to diabetes. Our results support a need for increased clinical training programs for mental health providers focusing on the mental health needs of young adults with diabetes, including depression, substance abuse, and eating disorders. In addition, continuing medical education programs for adult endocrinologists on mental health topics may foster an integration of mental and physical health care for young adults with type 1 diabetes.

Our thematic analysis also highlighted provider perceptions of the intensive psychosocial needs of young adults with type 1 diabetes, along with concerns

about time constraints in clinical care. Challenges regarding the psychosocial needs of young adult patients have similarly been reported in qualitative work with general internists (39). The third most common theme in our study of adult endocrinologists related to perceived divergent approaches to care by pediatric and adult diabetes providers. This observation calls for future study and an open dialogue between pediatric and adult providers. Qualitative research (24,40) has suggested that pediatric and adult care systems represent two different medical “subcultures” and that the young adult’s lack of preparation for successful independent participation in the adult health care culture may contribute to transition challenges. Pediatric diabetes providers may consider discussing with transitioning patients that adult providers may address glycemic control and diabetes complications in a different manner than experienced in pediatrics.

There are several limitations to this study. The study was limited to physicians with valid e-mail addresses listed in the AMA Physician Masterfile. Nonresponse bias is a concern, though the response rate is comparable with other studies using electronic physician surveys (28,41). Moreover, data were not available regarding demographic characteristics of the nonrespondents. Given the low proportion of respondents (9%) practicing in rural areas, future study is needed to capture the unique needs of transitioning young adults in rural areas. In addition, the results may be biased toward physicians who are interested in thinking about young adults with type 1 diabetes and thus may represent a “best case” scenario of transition care practices. Self-reported survey data are subject to recall bias and, perhaps, to a desire to provide socially desirable answers (though the anonymity of the survey should mitigate this). The survey was conducted in 2012, and the results may not reflect the latest advances in care following publication of expert consensus guidelines in recent years. Finally, this study focused solely on endocrinologists and did not evaluate the experiences of primary care physicians or nurse professionals, who may provide diabetes care for transitioning young adults with type 1 diabetes. Perceptions of young adult diabetes care from different types of adult diabetes

care providers, including primary care physicians as well as certified diabetes educators and advanced practice registered nurses, require further study.

In conclusion, our results provide important information about the experiences of adult endocrinologists caring for young adults with type 1 diabetes in the U.S. Our findings support the high importance of enhanced information transfer and direct communication between pediatric and adult diabetes providers, along with efforts to increase mental health provider training and access and to implement educational opportunities for adult endocrinologists on behavioral health topics specific to young adults with type 1 diabetes.

**Funding.** This work was supported by the National Institute of Diabetes and Digestive and Kidney Diseases (K12DK094721, K23DK102655, and P30DK036836), the National Institute of Child Health and Human Development (K24HD060786), and the William Randolph Hearst Foundation. This work was conducted with support from Harvard Catalyst | The Harvard Clinical and Translational Science Center (National Center for Research Resources and the National Center for Advancing Translational Sciences, National Institutes of Health Award UL1 TR001102) and financial contributions from Harvard University and its affiliated academic health care centers.

**Duality of Interest.** No potential conflicts of interest relevant to this article were reported.

**Author Contributions.** K.C.G. researched the data and wrote the article. G.H.T. and P.F. analyzed the data and reviewed and edited the article. J.S.N. and L.M.L. researched the data and reviewed and edited the article. J.A.F. contributed to the discussion and reviewed and edited the article. K.C.G. is the guarantor of this work and, as such, had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Prior Presentation.** Parts of this study were presented in abstract form at the 73rd Scientific Sessions of the American Diabetes Association, Chicago, IL, 21–25 June 2013.

## References

1. American Diabetes Association. Standards of medical care in diabetes—2013. *Diabetes Care* 2013;36(Suppl. 1):S11–S66
2. Peters A, Laffel L; American Diabetes Association Transitions Working Group. Diabetes care for emerging adults: recommendations for transition from pediatric to adult diabetes care systems: a position statement of the American Diabetes Association, with representation by the American College of Osteopathic Family Physicians, the American Academy of Pediatrics, the American Association of Clinical Endocrinologists, the American Osteopathic Association, the Centers for Disease Control and Prevention, Children with Diabetes, The Endocrine Society, the

- International Society for Pediatric and Adolescent Diabetes, Juvenile Diabetes Research Foundation International, the National Diabetes Education Program, and the Pediatric Endocrine Society (formerly Lawson Wilkins Pediatric Endocrine Society). *Diabetes Care* 2011;34:2477–2485
3. Clements MA, Foster NC, Maahs DM, et al.; T1D Exchange Clinic Network. Hemoglobin A1c (HbA1c) changes over time among adolescent and young adult participants in the T1D Exchange Clinic Registry. *Pediatr Diabetes*. 8 July 2015 [Epub ahead of print]. DOI: 10.1111/pedi.12295
4. Bryden KS, Dunger DB, Mayou RA, Peveler RC, Neil HA. Poor prognosis of young adults with type 1 diabetes: a longitudinal study. *Diabetes Care* 2003;26:1052–1057
5. Laing SP, Swerdlow AJ, Slater SD, et al. The British Diabetic Association Cohort Study, I: all-cause mortality in patients with insulin-treated diabetes mellitus. *Diabet Med* 1999;16:459–465
6. Jacobson AM, Hauser ST, Willett J, Wolfsdorf JI, Herman L. Consequences of irregular versus continuous medical follow-up in children and adolescents with insulin-dependent diabetes mellitus. *J Pediatr* 1997;131:727–733
7. Wills CJ, Scott A, Swift PG, Davies MJ, Mackie AD, Mansell P. Retrospective review of care and outcomes in young adults with type 1 diabetes. *BMJ* 2003;327:260–261
8. Bryden KS, Peveler RC, Stein A, Neil A, Mayou RA, Dunger DB. Clinical and psychological course of diabetes from adolescence to young adulthood: a longitudinal cohort study. *Diabetes Care* 2001;24:1536–1540
9. Laing SP, Jones ME, Swerdlow AJ, Burden AC, Gatling W. Psychosocial and socioeconomic risk factors for premature death in young people with type 1 diabetes. *Diabetes Care* 2005;28:1618–1623
10. Lotstein DS, Seid M, Klingensmith G, et al.; SEARCH for Diabetes in Youth Study Group. Transition from pediatric to adult care for youth diagnosed with type 1 diabetes in adolescence. *Pediatrics* 2013;131:e1062–e1070
11. Blum RW, Garell D, Hodgman CH, et al. Transition from child-centered to adult health-care systems for adolescents with chronic conditions. A position paper of the Society for Adolescent Medicine. *J Adolesc Health* 1993;14:570–576
12. Weissberg-Benchell J, Wolpert H, Anderson BJ. Transitioning from pediatric to adult care: a new approach to the post-adolescent young person with type 1 diabetes. *Diabetes Care* 2007;30:2441–2446
13. Garvey KC, Wolpert HA, Rhodes ET, et al. Health care transition in patients with type 1 diabetes: young adult experiences and relationship to glycemic control. *Diabetes Care* 2012;35:1716–1722
14. Hanna KM, Weaver MT, Stump TE, et al. Initial findings: primary diabetes care responsibility among emerging adults with type 1 diabetes post high school and move out of parental home. *Child Care Health Dev* 2013;39:61–68
15. Helgeson VS, Reynolds KA, Snyder PR, et al. Characterizing the transition from paediatric to adult care among emerging adults with type 1 diabetes. *Diabet Med* 2013;30:610–615
16. Insabella G, Grey M, Knafel G, Tamborlane W. The transition to young adulthood in youth with type 1 diabetes on intensive treatment. *Pediatr Diabetes* 2007;8:228–234
17. Busse FP, Hiermann P, Galler A, et al. Evaluation of patients' opinion and metabolic control after transfer of young adults with type 1 diabetes from a pediatric diabetes clinic to adult care. *Horm Res* 2007;67:132–138
18. Kipps S, Bahu T, Ong K, et al. Current methods of transfer of young people with Type 1 diabetes to adult services. *Diabet Med* 2002;19:649–654
19. Pacaud D, Stephure D, Dele-Davies H. Problems in transition from pediatric to adult care in individuals with diabetes. *Can J Diabetes* 2005;40:29–35
20. Raymond JK, Duke DC, Shimomaeda L, Harris MA. Looking forward to transition: perspectives on transition from pediatric to adult diabetes care. *Diabetes Manag (Lond)* 2013;3
21. Nakhla M, Daneman D, To T, Paradis G, Guttman A. Transition to adult care for youths with diabetes mellitus: findings from a Universal Health Care System. *Pediatrics* 2009;124:e1134–e1141
22. Dovey-Pearce G, Hurrell R, May C, Walker C, Doherty Y. Young adults' (16–25 years) suggestions for providing developmentally appropriate diabetes services: a qualitative study. *Health Soc Care Community* 2005;13:409–419
23. Visentin K, Koch T, Kralik D. Adolescents with type 1 diabetes: transition between diabetes services. *J Clin Nurs* 2006;15:761–769
24. Garvey KC, Beste MG, Luff D, Atakov-Castillo A, Wolpert HA, Ritholz MD. Experiences of health care transition voiced by young adults with type 1 diabetes: a qualitative study. *Adolesc Health Med Ther* 2014;5:191–198
25. Waitzfelder B, Pihoker C, Klingensmith G, et al.; SEARCH for Diabetes in Youth Study Group. Adherence to guidelines for youths with diabetes mellitus. *Pediatrics* 2011;128:531–538
26. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009;42:377–381
27. Vigersky RA, Fish L, Hogan P, et al. The clinical endocrinology workforce: current status and future projections of supply and demand. *J Clin Endocrinol Metab* 2014;99:3112–3121
28. de Beaufort C, Jarosz-Chobot P, Frank M, de Bart J, Deja G. Transition from pediatric to adult diabetes care: smooth or slippery? *Pediatr Diabetes* 2010;11:24–27
29. Cooley WC, Sagerman PJ; American Academy of Pediatrics; American Academy of Family Physicians; American College of Physicians; Transitions Clinical Report Authoring Group. Supporting the health care transition from adolescence to adulthood in the medical home. *Pediatrics* 2011;128:182–200
30. Endocrine Society. Managing the transition of care for patients with type 1 diabetes [article online], 2012. Available from <https://www.endocrine.org/education-and-practice-management/quality-improvement-resources/clinical-practice-resources/transition-of-care>. Accessed 19 November 2015
31. Sebastian S, Jenkins H, McCartney S, et al. The requirements and barriers to successful transition of adolescents with inflammatory bowel disease: differing perceptions from a survey of adult and paediatric gastroenterologists. *J Crohn's Colitis* 2012;6:830–844
32. Hait EJ, Barendse RM, Arnold JH, et al. Transition of adolescents with inflammatory bowel disease from pediatric to adult care: a survey of adult gastroenterologists. *J Pediatr Gastroenterol Nutr* 2009;48:61–65
33. Suris JC, Akre C, Rutishauser C. How adult specialists deal with the principles of a successful transition. *J Adolesc Health* 2009;45:551–555
34. Ducat L, Philipson LH, Anderson BJ. The mental health comorbidities of diabetes. *JAMA* 2014;312:691–692
35. Ducat L, Rubenstein A, Philipson LH, Anderson BJ. A review of the mental health issues of diabetes conference. *Diabetes Care* 2015;38:333–338
36. Peyrot M, Rubin RR, Lauritzen T, Snoek FJ, Matthews DR, Skovlund SE. Psychosocial problems and barriers to improved diabetes management: results of the cross-national Diabetes Attitudes, Wishes and Needs (DAWN) Study. *Diabet Med* 2005;22:1379–1385
37. Hislop AL, Fegan PG, Schlaeppli MJ, Duck M, Yeap BB. Prevalence and associations of psychological distress in young adults with Type 1 diabetes. *Diabet Med* 2008;25:91–96
38. Lawrence JM, Standiford DA, Loots B, et al.; SEARCH for Diabetes in Youth Study. Prevalence and correlates of depressed mood among youth with diabetes: the SEARCH for Diabetes in Youth study. *Pediatrics* 2006;117:1348–1358
39. Peter NG, Forke CM, Ginsburg KR, Schwarz DF. Transition from pediatric to adult care: internists' perspectives. *Pediatrics* 2009;123:417–423
40. Reiss JG, Gibson RW, Walker LR. Health care transition: youth, family, and provider perspectives. *Pediatrics* 2005;115:112–120
41. Nicholls K, Chapman K, Shaw T, et al. Enhancing response rates in physician surveys: the limited utility of electronic options. *Health Serv Res* 2011;46:1675–1682