Published in final edited form as:

Diabetes Educ. 2014 May ; 40(3): 329–335. doi:10.1177/0145721714527519.

Patient Perception of Midlevel Providers in Pediatric Diabetes Care

Erica Brecht Andrews¹, Joan Thomas, MS, RD¹, Lindsay Jaacks¹, Ralph D'Agostino Jr, PhD², Dianne Ward, EdD¹, and Elizabeth J. Mayer-Davis, PhD^{1,3}

¹Department of Nutrition, Gillings School of Global Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

²Department of Biostatistical Sciences, Wake Forest University School of Medicine, Winston-Salem, NC, USA

³Department of Medicine, School of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA

Abstract

Purpose—The purpose of this study was to evaluate patient perception of the role of mid-level providers among pediatric type 1 diabetes (T1DM) patients.

Methods—The study population was a convenience sample of 82 youth with T1DM who were enrolled in the SEARCH for Diabetes in Youth Study Carolina site and attended either baseline (n=22) or follow-up (n=60) study visits between 25 May 2012 and 3 October 2012. Self-administered surveys queried participant understanding of provider roles, perceived employment of providers at clinic, and if participants had seen providers since diagnosis. Mid-level providers of interest included dietitians, nurse practitioners (NP), physician assistants (PA), and medical social workers (MSW). Mean proportions for each provider were compared to dietitians (referent) using a t-test. Fisher's Exact Tests were used to determine associations between survey responses.

Results—Baseline participants reported seeing a dietitian since diagnosis more often than they reported seeing an NP, PA, or MSW. Both baseline and follow-up participants reported understanding the role of dietitians significantly more than they reported understanding the role of other providers. Dietitians were reported to be employed at clinics more frequently than PAs or MSWs by all participants. Self-reported understanding of providers was associated with patients seeing the provider. Seeing a provider was also associated with patient-reported provider employment at diabetes care clinic.

Conclusions—The survey population reported a high understanding of dietitian roles. However, the roles of other mid-level providers were not as well understood by youth with T1DM and their parents, which could represent a missed opportunity for care.

From 2001 to 2009, the incidence of type 1 diabetes (T1DM) in non-Hispanic white youth in the US increased from 24.1 per 100,000 person-years to 27.2 per 100,000 person-years.¹

Per-person annual out of pocket medical expenditures for privately insured youth with diabetes were estimated to be \$7593 greater than for youth without diabetes in 2007.² The American Diabetes Association (ADA) recently released data that showed the cost of diabetes care has increased by 41% since 2007, and the total cost of diabetes has risen to \$245 billion in 2012.³ Mid-level health care providers are much less expensive to employ than physicians⁴⁻⁶, and as the cost of diabetes care is rising, it is important to consider these providers as alternatives.

The ADA recommends that newly diagnosed T1DM patients receive referrals to a registered dietitian for medical nutrition therapy (MNT), to a diabetes nurse educator for diabetes self-management education (DSME), and to a behavioral specialist to evaluate and counsel the family and patient at diagnosis and as needed thereafter.⁷ The ADA states that MNT, usually given by a dietitian, should be covered by all insurance types because it can lead to reduced costs in the long run.⁷

The work of medical social workers should be covered by Medicaid which reimburses for mental and behavioral health services.⁸ T1DM patients with frequent readmission to the hospital for complications were found to have significant psychosocial problems, and many of them needed to be targeted for social work intervention.⁹ Medical social workers are an integral part of a diabetes care team, and should be utilized by patients, especially after diagnosis.

Inclusion of mid-level providers had positive health outcomes in adults with pre-diabetes or diabetes,¹⁰⁻¹¹ but less is known about mid-level provider use in youth with T1DM.¹² A study of Pakistani youth was one of few to look at mid-level providers in youth with T1DM. Youth who underwent DSME, administered by a pediatric endocrinologist, diabetes nurse, and dietitian, had improved glycemic control three months later compared to the group who did not undergo DSME with these providers (HbA1C before and after DSME of 9.67 ± 0.65 and 8.49 ± 0.53 , respectively).¹²

When surveyed about their care, Hanberger et al reported that pediatric patients and their parents were happy with their care, but reported that improvements could be made in making care more assessable, and informing patients and their parents about self-care, test results and treatment options.¹³ Though this study did not look at mid-level providers specifically, the gaps in care that patients reported could be filled by mid-level providers who may have more time to explain self-care and treatment options to patients. To advance understanding of patients' perceptions of mid-level providers, the objective of the present study was to evaluate the role of mid-level providers in pediatric diabetes care, including how well patients understood the role of mid-level providers, how often mid-level providers are employed at clinics, and if patients have seen mid-level providers since diagnosis.

Methods

Sample

This cross-sectional study was an ancillary study to the ongoing multi-center SEARCH for Diabetes in Youth Study (SEARCH).¹⁴ SEARCH was designed to estimate the prevalence

and incidence of diabetes among a diverse cohort of youth in the US, and to characterize diabetes-related health outcomes and their risk factors including barriers to care and quality of care. SEARCH is currently identifying newly diagnosed diabetes patients (baseline participants), as well as following up with patients diagnosed with diabetes five or more years ago (follow-up participants). The sample population for the present report was a convenience sample of SEARCH Study participants with T1DM who attended baseline or follow-up study visits at the SEARCH Carolina Site with research clinics in Greenville, Charleston, and Columbia South Carolina between 25 May 2012 and 3 October 2012. These three research clinic sites were not necessarily where the study participants received their diabetes care. SEARCH baseline and SEARCH follow-up participants were both used in order to determine how understanding of mid-level providers differed among patients who had been diagnosed with diabetes recently, compared to those who had longer diabetes durations. Baseline and follow-up participants were different individuals with T1DM; some of whom were recently diagnosed with diabetes (baseline participants) and others of whom had been diagnosed with diabetes at least five years prior (follow-up participants).

The baseline study visit underway during this ancillary study data collection time period included participants who were diagnosed in 2012. T1DM participants eligible for the baseline study visit included all participants who were ≥ 10 years of age at diagnosis (regardless of type or race/ethnicity), all minority participants (regardless of age at diagnosis), and a 50% sample of non-Hispanic white participants < 10 years of age at diagnosis. SEARCH follow-up visits underway during this ancillary study included participants with longer diabetes durations, who were diagnosed between 2002-2006 or in 2008, who had completed at least one previous study visit, had diabetes for ≥ 5 years, and completed their most recent SEARCH visit > 2 years ago.

Research Design

A cross-sectional, observational study design was chosen, as the SEARCH study had an appropriate patient population to collect meaningful data from, and the desired outcome of the study was to better understand how pediatric patients and their parents understood mid-level providers. The study was not interested in changing the experience of patients and their families, and there was not a specific sub-population to be queried, therefore this study design worked well for the scope of the study, and the nature of the data to be collected.

Measures

In addition to the usual SEARCH surveys, an additional survey specific to issues related to mid-level providers (Figure 1) was sent to all study participants with T1DM who scheduled a baseline or follow-up visit during the study period. The survey was completed by the person with diabetes if he/she was ≥ 18 years of age or their parent/guardian if the person with diabetes was < 18 years of age. Surveys were collected at the time of the visit. The survey addressed the participants' use of, perceived access to, and understanding of mid-level providers in diabetes care. The mid-level providers included in the survey were dietitians, nurse practitioners (NPs), physician assistants (PAs), and medical social workers (MSWs). Demographic data were from the initial participant survey, which was completed

by participants or their parent/guardian shortly after diagnosis and before their SEARCH baseline visit.

Statistical analysis

All data were analyzed using SAS 9.3 software (SAS Institute, Cary, North Carolina). Mean proportions for each provider were compared to dietitians (referent) using t-tests stratified by baseline and follow-up participants. Due to small sample sizes, Fisher's Exact Tests were used to evaluate associations between survey questions. Values are presented as mean (SD) or %. Statistical significance was considered for $P < 0.05$.

Results

Of the 94 participants with T1DM who had a SEARCH study visit during the study period, 82 responded to the survey and had complete data (response rate 87.2%). Baseline participants ($n = 22$) were 11.6 (3.6) years old and had a diabetes duration of 2.2 (1.1) months. Follow-up visit participants ($n = 60$) were 17.4 (4.1) years old and had a diabetes duration of 80.4 (11.6) months (Table 1).

For baseline participants, 95.2% reported fully understanding the role of dietitians, with 73.7% reporting fully understanding MSWs (Table 2). Among baseline participants 86.4% reported a dietitian being employed at their clinic, and 81.8% reported an NP being employed, but only 47.6% reported MSW employment. Of these participants, 84.2% reported seeing a dietitian for diabetes care, while only 40% reported seeing a MSW.

Among follow-up participants, 91.7% reported fully understanding the role of dietitians, while only 44.1% reported fully understanding MSWs (Table 2). For questions regarding clinic employment, 64.4% of these participants reported a dietitian being employed at their clinic and 74.6% reported an NP being employed, but only 22% reported a MSW being employed. Among follow-up participants, 69.5% reported ever seeing a dietitian for diabetes care, and 18.2% reported ever seeing a MSW.

Baseline participants reported fully understanding dietitians more often than other providers, but the difference between understanding of dietitians and understanding the other providers was not statistically significant (Table 2). Follow-up participants reported understanding the role of dietitians significantly more often than they reported understanding the role of all other providers.

Baseline participants reported dietitian employment at clinic significantly more than they reported PAs and MSWs being employed at their diabetes clinic (Table 2). Follow-up participants reported dietitian employment at clinic significantly more than they reported NPs and MSWs being employed at their diabetes clinic. Baseline participants reported ever seeing a dietitian significantly more than all other providers, and follow-up participants reported ever seeing a dietitian significantly more than they reported ever seeing a PA or MSW.

There was no statistically significant difference ($p = 0.20$) in understanding the role of dietitians among participants who saw a dietitian, did not see a dietitian, or were unsure if

they had seen a dietitian since diagnosis. In other words, participants reported understanding the role of dietitians regardless of if they had seen a dietitian. In fact, 85.7% of participants who reported *not* seeing a dietitian said that they fully understood the role of dietitians.

The same was not true for NPs, PAs, and MSWs. For these providers, there were statistically significant differences in how the participants understood these providers' roles depending on whether the participants had seen the provider, had not seen the provider, or were unsure if they had seen the provider since diagnosis. In other words, if the participant had seen the provider, they were more likely to report understanding the provider's role.

For all providers, there was a statistically significant difference ($p < 0.01$) in seeing providers based on employment of the provider at the participant's diabetes care clinic. If participants reported that a provider was employed at their clinic, they were more likely to report seeing that provider since diagnosis.

Discussion

Diabetes patients and their parents reported understanding the role of dietitians significantly more often than other providers. Patients and parents were more likely to report seeing dietitians and access to dietitians at their diabetes care clinic than they were to report other providers, regardless of their diabetes duration. Comparing MSWs to other providers, follow-up participants reported understanding the role of MSWs less frequently, reported MSW employment at clinic less frequently, and reported seeing MSWs less frequently.

There was no difference in understanding the role of dietitians based on whether the patient reported seeing a dietitian, or reported never seeing a dietitian. More participants reported "fully understand" for dietitian roles than any other provider, across both the baseline and follow-up groups, which could indicate that participants understood the role of dietitians without ever seeing them. Though the survey question asked about understanding the role of providers relating to *diabetes care and management*, it is possible that participants answered the question based on knowledge that was unrelated to their diabetes care.

The survey question regarding employment at clinic was intended to determine *perceived* access to care rather than actual access to care (Figure 1). Specifically, we were more interested in whether patients or their parents believed they could obtain care from these providers at their diabetes care clinic than if the provider was actually employed there. This question could have been problematic for baseline participants if they did not yet know where they would be getting their diabetes care, and it could have been confusing for follow-up participants who may have been a patient at multiple diabetes care clinics since diagnosis.

The results from this survey question show that patients are more likely to see providers if they are employed at their clinic. If this is true, increasing visibility of mid-level care providers employment at clinics could impact how often patients report seeing a provider. This could be especially important with medical social workers, who seems to be under-utilized providers.

A limitation of this study was the small sample size, especially for baseline participants. The small sample size makes the data for baseline participants less reliable than the data for the participants with a longer duration, however it is still helpful in determining how mid-level providers are used and how their roles are understood at diagnosis. Further, the survey was self-administered and patient misunderstanding of the questions may have generated unanticipated bias. In the future, an interview format may be helpful for improving data quality. Finally, this study was cross-sectional and therefore the causal directions of the observed associations could not be definitively determined. For example, we do not know whether participants understood the role of providers because they had seen them, or if they had seen the provider because they understood their role, since both questions were asked at the same time.

Implications for diabetes educators and conclusions

This study has important implications for diabetes providers of all levels, but especially mid-level providers. It shows that pediatric diabetes patients have a high perceived understanding of and high perceived access to dietitians, and are more likely to know if they have seen a dietitian after diagnosis than other providers. Particularly for patients with longer diabetes duration, patients and their parents had relatively low perceived understanding of the role of other mid-level providers and did not report seeing other mid-level providers after diagnosis as frequently. Thus, other than dietitians, pediatric diabetes patients may be missing care opportunities that could have a positive impact on their diabetes care and management. The low perceived understanding of the role of MSWs and the perception that they do not have access to these providers is of concern because of the importance of psychosocial support and of the role MSWs to help patients receive of insurance coverage for diabetes supplies, and access to necessary providers. The ADA recommends psychosocial support after diagnosis⁷, but only 40% of baseline participants and 18.8% of follow-up participants in our study reported ever seeing a MSW; a provider who could offer this support. Additionally, around 45% of baseline participants and around 30% of follow-up participants were on Medicaid or were uninsured (Table 1), and medical social workers can be instrumental in helping these patients receive appropriate care. As the burden of diabetes increases in youth, mid-level providers may have an increasingly large role in pediatric diabetes care. Ensuring that patients and their families understand the role of mid-level providers could be a factor that improves patient care and satisfaction. In summary, the present study was one of few to look at pediatric patient perception of mid-level providers. There is evidence that mid-level providers can impact health outcomes in youth with diabetes,¹² as they impact health outcomes in adults,^{10, 11} but future work is needed to fully understand and realize their impact.

References

1. Lawrence JM, Standiford DA, Loots B, et al. Prevalence and correlates of depressed mood among youth with diabetes: The SEARCH for diabetes in youth study. *Pediatrics*. 2006; 117(4):1348–1358. [PubMed: 16585333]
2. Shrestha S, Zhang P, Albright A, Imperatore G. Medical expenditures associated with diabetes among privately insured U.S. youth in 2007. *Diabetes Care*. 2011. 34(5):1097–1101.

3. Herman WH. The economic costs of diabetes: Is it time for a new treatment paradigm? *Diabetes Care*. 2013; 36(4):775–776. [PubMed: 23520368]
4. Department of Labor, US. Physician Assistants from the Occupational Outlook Handbook from Bureau of Labor Statistics. Available at : <http://www.bls.gov/ooh/healthcare/physician-assistants.htm>. Accessibility verified March 19, 2013
5. Department of Labor, US. Dietitians and nutritionists from the Occupational Outlook Handbook from Bureau of Labor Statistics. Available at : <http://www.bls.gov/ooh/healthcare/Dietitians-and-nutritionists.htm>. Accessibility verified March 19, 2013
6. Department of Labor, US. Physicians and Surgeons from the Occupational Outlook Handbook from Bureau of Labor Statistics. Available at : <http://www.bls.gov/ooh/healthcare/Physicians-and-surgeons.htm>. Accessibility verified March 19, 2013
7. American Diabetes Association. Standards of medical care in diabetes--2013. *Diabetes Care*. 2013; 36(Suppl 1):S11–66. [PubMed: 23264422]
8. Mental Health Services. Keeping American Healthy from Medicaid.gov.. Available at <http://www.medicaid.gov/Medicaid-CHIP-Program-Information.ByTopics/Benefits/Mental-Health-Services.html>
9. Nilsson D. Psycho-social problems faced by “frequent flyers” in a pediatric diabetes unit. *Soc Work Health Care*. 2001; 33(3-4):53–69.
10. Gagnon C, Brown C, Couture C, et al. A cost-effective moderate-intensity interdisciplinary weight-management programme for individuals with prediabetes. *Diabetes Metab*. 2011; 37(5):410–418. [PubMed: 21489843]
11. Whittemore R, Melkus GD, Alexander N, et al. Implementation of a lifestyle program in primary care by nurse practitioners. *J Am Acad Nurse Pract*. 2010; 22(12):684–693. [PubMed: 21129077]
12. Qayyum AA, Lone SW, Ibrahim MN, Atta I, Raza J. Effects of diabetes self-management education on glycaemic control in children with insulin-dependent diabetes mellitus. *J Coll Physicians Surg Pak*. 2010; 20(12):802–805. [PubMed: 21205545]
13. Hanberger L, Ludvigsson J, Nordfeldt S. Quality of care from the patient's perspective in pediatric diabetes care. *Diabetes Res Clin Pract*. 2006; 72(2):197–205. [PubMed: 16300853]
14. SEARCH for Diabetes in Youth Study Group. Liese AD, D'Agostino RB Jr, et al. The burden of diabetes mellitus among US youth: Prevalence estimates from the SEARCH for diabetes in youth study. *Pediatrics*. 2006; 118(4):1510–1518. [PubMed: 17015542]

(Participants were asked each question below regarding dietitians, nurse practitioners, physician assistants, and medical social workers individually)	
If participant was under 18	If participant was 18 or older
How well do you understand the role of the following health care providers in your child's diabetes care and management?	How well do you understand the role of the following health care providers in your diabetes care and management?
Does the clinic your child goes to for his/her diabetes care employ any of the following providers?	Does the clinic you go to for your diabetes care employ any of the following providers?
Has your child ever seen any of the following providers during their visit to the clinic?	Have you ever seen any of the following providers during your visit to the clinic?

Figure 1.
Survey Questions

Table 1

Characteristics of participants with type 1 diabetes who completed the mid-level provider survey in the SEARCH for Diabetes in Youth Study, Carolina site.^{*1*}

	Baseline n = 22	Follow-Up n = 60
Age (years)	11.6 (3.6)	17.4 (4.1)
Diabetes duration (months)	2.2 (1.1)	80.4 (11.6)
Female	45.5 (10)	45.0 (27)
Private insurance	*54.6 (12)	*69.2 (36)
Parent education Bachelor's degree	*59.1 (13)	*42.3 (22)
HbA1C (%)	7.4 (1.2)	+8.6 (1.8)
Race/Ethnicity		
Black	18.2 (4)	21.7 (13)
Hispanic	0.0 (0)	1.7 (1)
Non-Hispanic White	81.8 (18)	76.7 (46)

^{*1*}Values presented are mean (SD) or % (n).

* n = 8 missing from this category.

+ missing from this category.

Table 2

Participant responses to the mid-level provider survey in the SEARCH for Diabetes in Youth Study, Carolina site. ¹

	Baseline n = 22 [†]				Follow-Up n = 60 [†]			
	Dietitian	Nurse Practitioner	Physician Assistant	Medical Social Worker	Dietitian	Nurse Practitioner	Physician Assistant	Medical Social Worker
<i>Understand the role?</i>								
Fully understand	95.2 (20)	77.3 (14)	77.8 (14)	73.7 (14)	91.7 (55)	70.0 (42)	63.3 (38)	44.1 (26)
Somewhat understand	4.8 (1)	18.2 (4)	16.7 (3)	21.1 (4)	8.3 (5)	23.3 (14)	28.3 (17)	35.6 (21)
Do not understand	0.0 (0)	4.6 (1)	5.6 (1)	5.3 (1)	0.0 (0)	6.7 (4)	8.3 (5)	20.3 (12)
<i>P-value *</i>	Ref	0.07	0.10	0.06	Ref	0.0007	<.0001	<.0001
<i>Provider employed at your diabetes care clinic?</i>								
Yes	86.4 (19)	81.8 (18)	50.0 (10)	47.6 (10)	64.4 (38)	74.6 (44)	51.7 (31)	22.0 (13)
Not sure	9.1 (2)	18.2 (4)	25.0 (5)	42.9 (9)	25.4 (15)	22.0 (13)	40.0 (24)	69.5 (41)
No	4.6 (1)	0.0 (0)	25.0 (5)	9.5 (2)	10.2 (6)	3.4 (2)	8.3 (5)	8.5 (5)
<i>P-value *</i>	Ref	1.0	0.008	0.007	Ref	0.02	0.2	0.007
<i>Ever seen this provider for your diabetes care?</i>								
Yes	84.2 (16)	52.4 (11)	27.8 (5)	40.0 (8)	69.5 (41)	65.5 (38)	41.1 (23)	18.2 (10)
Not sure	5.3 (1)	33.3 (7)	33.3 (6)	30.0 (6)	8.5 (5)	13.8 (8)	25.0 (14)	25.5 (14)
No	10.5 (2)	14.3 (3)	38.9 (7)	30.0 (6)	22.0 (13)	20.7 (12)	33.9 (19)	56.4 (31)
<i>P-value *</i>	Ref	0.04	0.0005	0.003	Ref	0.8	0.001	<.0001

¹ Values presented are % (n)

* P-value for one-sample t-test comparing the mean proportions for questions regarding dietitians to the mean proportions for questions regarding other mid-level providers. The p-value reflects differences between the percent that reported "fully understand", or who responded "yes," across different providers.

[†] values vary slightly due to missing data.