Pediatric Endocrinologists' Management of Children With Type 2 Diabetes

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OBJECTIVE — To understand physician behaviors and attitudes in managing children with type 2 diabetes.

RESEARCH DESIGN AND METHODS — A survey was mailed to a nationwide sample of pediatric endocrinologists (PEs).

RESULTS — A total of 40% of PEs surveyed responded (211 of 527). Concordance with current monitoring guidelines varied widely, ranging from 36% (foot care) to 93% (blood pressure monitoring). Given clinical vignettes addressing hyperlipidemia, hypertension, and microalbuminuria, only 34% of PEs were fully concordant with current treatment guidelines. Reported barriers included concerns about patient adherence, insufficient scientific evidence about treatment, and lack of familiarity with current recommendations. Providers aged ≤45 years or in clinical practice <10 years reported significantly more aggressive management behaviors and had higher concordance with guidelines.

CONCLUSIONS — Screening and management of pediatric type 2 diabetes varied widely among PEs, suggesting opportunities for quality improvement. More aggressive management of type 2 diabetes among younger providers may be related to recent training when type 2 diabetes was more common.

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The incidence of type 2 diabetes in children is increasing (1), and children with type 2 diabetes are at high risk to develop diabetes-related complications, including hyperlipidemia, hypertension, and microalbuminuria (2–4). Despite limited scientific evidence, several consensus statements on the assessment and management of pediatric type 2 diabetes have been developed (4–6). Current understanding of physician management of pediatric type 2 diabetes is limited (7–10). We conducted a survey to better understand pediatric endocrinologists' (PEs') behaviors and attitudes related to the management of pediatric type 2 diabetes.

RESEARCH DESIGN AND METHODS

— Experts in diabetes, health behavior, and health services research created a survey (online appendix [available at http://care.diabetesjournals.org/cgi/content/full/dc09-1333/DC1]) targeted for PEs managing pediatric type 2 diabetes. The survey included *1*) provider characteristics, *2*) description of clinic setting and patient population, *3*) frequency of tests for care of type 2 diabetes, *4*) case vignettes related to management of comorbidities in type 2 diabetes, *5*) medications prescribed for type 2 diabetes, *6*) attitudes and perceived barriers to the management of type 2 diabetes, and *7*) clinic infrastructure for chronic disease management (assessed using a subscale of the Assessment of Chronic Illness Care Scale [11]). Survey items were based on current recommendations of the American Diabetes Association (ADA) (4,5) and the National Heart, Lung, and Blood Institute (NHLBI) guidelines for management of hypertension in adolescents (12). Three case vignettes to evaluate providers' management aggressiveness included *1*) a 15 year old with dyslipidemia, *2*) a 14 year old with hypertension, and *3*) a 17 year old with hypertension and microalbuminuira.

A master file containing addresses of the nation's PEs was obtained from the American Medical Association. Half of the PEs were randomly selected, and surveys were mailed between August and September 2007. Responders had the option of mailing back the survey or taking it online (through www.surveymonkey.com). Two additional mailings were sent to nonresponders. The final mailing offered a $20 gift card for survey completion. The Vanderbilt Institutional Review Board approved all aspects of the study.

Analyses were performed using STATA 8.2 (College Park, TX). Descriptive statistics were performed on all survey responses. In addition, each response related to screening or treatment behavior was assigned a numeric value based on screening frequency or aggressiveness of treatment choice. Summary scores were calculated to measure the total aggressiveness for screening as well as for treatment. Aggressiveness scores reflected the level of care provided and did not necessarily indicate the appropriateness of care. Each response related to screening or treatment behavior was also assigned a point if it was deemed concordant with current ADA or NHLBI guidelines. Summary scores were calculated to measure the total concordance for screening, and for treatment. Analyses using *t* tests examined the relationship between provider characteristics and *1*) their level of monitoring or treatment aggressiveness and *2*) their level of concordance with current guidelines.

RESULTS

— Of 527 eligible surveys, there were 210 responses (40%). Fifty percent were from female subjects, 53%

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Table 1—*Screening, monitoring, and treatment practices (percent of responding endocrinologists endorsing)*

	Frequency of testing				
	Every ≤ 3 months	Every 6 months	Every 1 year	Every 2+ years	Not used
Screening/monitoring tests					
A1C	91.5*	7.5	0	0	1
Blood pressure	93*	6.5	0	0	0.5
Fasting lipid panel	2.5	15	72.5*	9*	1
Retinal exam	5.5	0.5	77*	11	6
Foot exam	28	12	35.5*	8	16
Liver function tests	7.5	20	57*	8.5	7
Microalbumin test	5.5	4.5	86*	2.5	1.5

	LDL level at:		
	110 mg/dl	140 mg/dl	170 mg/dl
Treatment of hyperlipidemia			
Continue lifestyle change, recheck every 3 months	55*	18*	2
Refer to dietitian/physical therapist	39*	45*	18
Start lipid medications	2	25	50*
Change intensity of medications	0	0.5	12*
Refer to lipid specialist	0	8*	17*

	Systolic blood pressure at:		
	95%	99%	≥99% + microalbuminuria
Treatment of hypertension			
Continue present management, follow up in 3–6 months	11*	4.5	0.5
Intensify lifestyle changes, follow up in 3–6 months	39*	7	5
Refer to dietitian and/or exercise physiologist	40*	8	13
Start or intensity blood pressure–lowering medications	7*	70*	71*

Data are percent. *Concordance with current guideline recommendations.

were from subjects aged 26–45 years, and 74% were from white subjects. A total of 71% completed medical school in the U.S.; and 35% had practiced postfellowship for <5 years; 52% described themselves as a clinician, 20% as a researcher, 13% as a clinician-educator, and 12% as current fellows; and 45% of providers reported caring for three or more patients with type 2 diabetes weekly.

There was a wide range of practices for monitoring and management related to type 2 diabetes (Table 1**)**. For example, 43% were not in concordance for annual liver function test screenings, 64% for annual foot exams, 23% for annual retinal exams, 28% for lipid panels, and 14% for annual microalbumin screenings. While 25% of physicians would start lipid-lowering medication with an LDL of 140 mg/dl, 20% of physicians would not start a lipid-lowering medication with an LDL of 170 mg/dl. For hypertension management, 19.5% of the responses were not concordant with current guidelines on treating a patient with blood pressure at the 99th percentile. Similarly, 18.5% of the responses were not concordant with guidelines for a patient with blood pressure at the 99th percentile and microalbuminuria. Only 34% of PEs were fully concordant with all of the current guideline recommendations for lipid, blood pressure, and microalbuminuria management.

For lipid management, the top three perceived barriers were difficulties making lifestyle changes in patients (78%), insufficient evidence about best management practice (71%), and providers' lack of familiarity with subject matter (47%). For hypertension management, the top three barriers were difficulty making lifestyle changes in patients (67%), concerns about patient compliance (55%), and insufficient scientific evidence for best management practice (46%).

Younger providers (aged <45 years) and female physicians were associated ($P < 0.05$) with more aggressive screening/monitoring practices. U.S. medical graduates, physicians with clinical practice <10 years, or providers with lack of board certification were more aggressive in reported treatment of hyperlipidemia, hypertension, and microalbuminuria. Younger providers (aged <45 years) and those in clinical practice <10 years were modestly associated with higher concordance with guidelines for screening.

CONCLUSIONS — The results of this study demonstrate that there is wide variation in how PEs are managing pediatric type 2 diabetes. This variation is often nonconcordant with current guidelines set forth by the ADA and other expert panels. Possible reasons for the variation in testing and treatment include clinical inertia (13), lack of familiarity with current recommendations (14), pediatric endocrinologists' lack of experience with antihypertensive and cholesterol-lowering medications (14), lack of system-level approaches (15), and the current lack of rigorous scientific evidence to support aggressive medication therapy in adolescents (14). Additionally,

achieving adequate glycemic control in this patient population is challenging, and clinicians may focus on glycemic control with insufficient consideration of other issues. Younger PE's association with more aggressive screening and concordance with guidelines could be related to greater exposure to type 2 diabetes during their training.

Nonresponder bias is an important limitation of this study. Social desirability bias is another limitation since we only obtained provider's self-reported behaviors and not their actual behaviors in clinic. The wide variability seen in this study suggests room for improvement in current clinical practice. To achieve this goal, further research is necessary to determine the best management options in this high-risk population. Hopefully, studies such as the ongoing National Institutes of Health–funded Treatment Options for Type 2 Diabetes in Adolescents and Youth Study will help to address this challenge.

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R.L.R. has full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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