Pediatric Endocrinologists’ Management of Children With Type 2 Diabetes Mellitus

Running Title: Management of Pediatric Type 2 Diabetes

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Additional information for this article can be found in an online appendix at
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Objective: To understand physician behaviors and attitudes in managing children with Type 2 Diabetes (T2DM).

Research Design and Methods: A survey was mailed to a nationwide sample of pediatric endocrinologists (PEs).

Results: 40% of PEs surveyed responded (211/527). 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 ≤45 years old or in clinical practice <10 years reported significantly more aggressive management behaviors and had higher concordance with guidelines.

Conclusions: Screening and management of pediatric T2DM varied widely among PEs, suggesting opportunities for quality improvement. More aggressive management of T2DM among younger providers may be related to recent training when T2DM was more common.
The incidence of type 2 diabetes (T2DM) in children is increasing (1), and children with T2DM 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 T2DM have been developed(4-6). Current understanding of physician management of pediatric T2DM is limited(7-10). We conducted a survey to better understand pediatric endocrinologists’ (PEs) behaviors and attitudes related to the management of pediatric T2DM.

METHODS

Experts in diabetes, health behavior, and health services research created a survey (see Online Appendix http://care.diabetesjournals.org) targeted for PEs managing pediatric T2DM. The survey included: (1) provider characteristics, (2) description of clinic setting and patient population, (3) frequency of tests for care of T2DM, (4) case vignettes related to management of comorbidities in T2DM, (5) medications prescribed for T2DM, (6) attitudes and perceived barriers to the management of T2DM, 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(4,5) and the National Heart Lung Blood Institute 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 microalbuminuria.

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 (www.surveymonkey.com). Two additional mailings were sent to non-responders. 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, and 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%). 50% were female, 53% were 26-45 years old, and 74% were White. 71% completed medical school in the United States and 35% had practiced post-fellowship for less than 5 years; 52% described
themselves as a clinician, 20% as a researcher, 13% as a clinician-educator, and 12% as current fellows; 45% of providers reported caring for 3 or more patients with T2DM weekly.

There was a wide range of practices for monitoring and management related to T2DM (See 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 (BP) at the 99th percentile. Similarly, 18.5% of the responses were not concordant with guidelines for a patient with BP 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 (<45 yrs old) and female physicians were associated (p<0.05) with more aggressive screening/monitoring practices. US 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 (<45 yrs old) and those in clinical practice <10 years were modestly associated with higher concordance with guidelines for screening.

DISCUSSION

The results of this study demonstrate that there is wide variation in how PEs are managing pediatric T2DM. This variation is often non-concordant 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 anti-hypertensive 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 T2DM during their training.

Non-responder 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. In order 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 NIH-funded Treatment Options for Type 2 Diabetes in Adolescents and Youth
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(TODAY) study, will help to address this challenge.

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| Screening/Monitoring Tests   | Frequency of Testing | LDL level (mg/dl) at: | Systolic Blood Pressure (%) at: |
|------------------------------|----------------------|-----------------------|---------------------------------|
|                              | q ≤ 3 mo  | q6 mo | q1 yr  | q 2+ yr | Not Used | 110 | 140 | 170 |
| HbA1c                        | 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      |
| Treatment of Hyperlipidemia  | Continue lifestyle change, recheck q3 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% |
| Treatment of Hypertension    | Cont. 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 BP lowering meds | 7%* | 70%* | 71% |

*concordance with current guideline recommendations
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