



Trends and Characteristics of Self-reported Case Presentation of Diabetes Diagnosis Among Youth From 2002 to 2010: Findings From the SEARCH for Diabetes in Youth Study

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Diagnosis of diabetes in youth is increasing in the U.S. (1,2). It is not known how much of this change is due to an increase in diabetes and how much is due to improved case detection, especially for type 2 diabetes. Some researchers have hypothesized that part of the explanation for the increase in diabetes diagnosis in youth is increased screening, resulting in a higher percentage of cases being identified. The objective of this study was to assess whether the change in diabetes could be explained by changes in case identification by examining trends from 2002 to 2010 in self-reported case presentation of diabetes.

Briefly, there were 9,054 youth aged <20 years with newly diagnosed diabetes between 2002 and 2010 in the SEARCH for Diabetes in Youth study (3). Participants were asked, "How did you find out you had diabetes?" Responses were grouped into symptoms, checkup, community screening, or other. Self-reported case presentation patterns were examined in 3-year blocks to assess change over time, reported by diabetes type. We explored trends in

self-reported modes of diabetes diagnosis (i.e., symptoms, checkup, screening, and other method) and reported results unadjusted and then adjusted for age-group, sex, and race/ethnicity.

Results are presented in Table 1. Among youth with type 1 diabetes, >95% of them reported diabetes diagnosis due to symptoms and many fewer reported diagnosis due to checkup, health screening, or other. Self-report of case presentation remained stable from 2002 to 2010 for youth with type 1 diabetes. Among youth with type 2 diabetes, 65% reported diagnosis due to symptoms and 30% reported diagnosis during a regular checkup. Unlike type 1 diabetes, there were significant changes in reported case presentation for type 2 diabetes with presentation due to symptoms decreasing from 72.1% in 2002–2004 to 59.1% in 2008–2010.

Observed differences in patterns of the self-reported modes of case presentation by age and sex among youth with type 1 diabetes and by sex and race/ethnicity among youth with type 2 diabetes may reflect differences in how

diabetes presents, medical-seeking practices, or community awareness.

Of the few previous studies reporting on modes of diabetes diagnosis, none have included youth (4,5). Previous studies have found that adults with diabetes are most likely to report diagnosis due to symptoms (4,5).

While we found no evidence that increased incidence of type 1 diabetes was due to improvements in case finding, there was evidence of increased case finding among youth with type 2 diabetes. The changes in reported modes of case presentation over time for type 2 diabetes suggest that some of the trends in prevalence over this time period may be attributable to changes in health care or community screening patterns.

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Table 1—Self-reported case presentation of diabetes diagnosis by incident year and diabetes type among youth 20 years of age and younger, SEARCH for Diabetes in Youth Study 2002–2010

	Type 1 diabetes (n = 7,554)					Type 2 diabetes (n = 1,500)				
	Symptoms	Checkup	Community screening	Other	P value	Symptoms	Checkup	Community screening	Other	P value
Incident years										
2002–2004	95.4	3.7	0.2	0.7	0.0512	72.1	23.7	2.8	1.4	<0.0001
2005–2007	94.8	3.6	0.4	0.4		66.4	29.5	2.5	1.6	
2008–2010	94.2	4.1	0.3	0.3		59.1	37.1	3.3	0.5	
Adjusted estimates*										
2002–2004	95.9	3.2	0.2	0.2	0.0505	72.9	23.7	2.4	1.0	<0.0001
2005–2007	95.5	3.3	0.2	0.2		66.8	29.9	2.7	0.6	
2008–2010	94.9	3.4	0.3	0.3		59.8	36.9	3.0	0.4	

Data are %. *Adjusted for age-groups (0 to < 5 years, 5 to < 10 years, 10 years to < 15 years, 15 years and older), sex, and race/ethnicity (Asian/Pacific).

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References

- Lawrence JM, Imperatore G, Dabelea D, et al.; SEARCH for Diabetes in Youth Study Group. Trends in incidence of type 1 diabetes among non-Hispanic white youth in the U.S., 2002-2009. *Diabetes* 2014;63:3938–3945
- Dabelea D, Mayer-Davis EJ, Saydah S, et al.; SEARCH for Diabetes in Youth Study. Prevalence of type 1 and type 2 diabetes among children and adolescents from 2001 to 2009. *JAMA* 2014; 311:1778–1786
- SEARCH Study Group. SEARCH for Diabetes in Youth: a multicenter study of the prevalence, incidence and classification of diabetes mellitus in youth. *Control Clin Trials* 2004;25:458–471
- Rodbard HW, Green AJ, Fox KM, Grandy S. Trends in method of diagnosis of type 2 diabetes mellitus: results from SHIELD. *Int J Endocrinol* 2009;2009:796206
- Clark NG, Fox KM, Grandy S; SHIELD Study Group. Symptoms of diabetes and their association with the risk and presence of diabetes: findings from the Study to Help Improve Early evaluation and management of risk factors Leading to Diabetes (SHIELD). *Diabetes Care* 2007;30:2868–2873