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Massachusetts
Department Of
Public Health

Evaluation of School Children Diagnosed with Type 1 Diabetes in Woburn, MA

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Center for Environmental
Health, Community
Assessment Program

Appendix A

I. Background/Introduction

At the request of concerned parents in Woburn, the Massachusetts Department of Public Health (MDPH) was asked to evaluate the incidence of type 1 diabetes among children attending the Goodyear Elementary School in Woburn, MA. Initial reports suggested that seven current and former students of the Goodyear School had been diagnosed with type 1 diabetes during 2003 – 2004 and concern was expressed regarding the possibility that the school environment may play a role in the incidence of the disease.

The Goodyear School (located in East Woburn) is one of nine elementary schools in Woburn along with two middle schools and a high school. A private elementary school is also located in the city of Woburn.

II. Methods

Similar to other state health departments, Massachusetts does not have a registry or surveillance system to track new diagnoses of diabetes. Therefore, readily available statistics on the incidence of this health outcome in cities and towns throughout the Commonwealth do not exist. The Massachusetts Department of Education (MDOE) regulations, however, provide the MDPH with access to student health records for purposes of a public health investigation.

In an attempt to obtain accurate numbers of children in Woburn diagnosed with type 1 diabetes, MDPH staff contacted the school nurse leader for the Woburn Public School system to ask for a list of children with type 1 diabetes by individual school. The school nurse at the private elementary school in Woburn was also contacted, along with school nurses from several other private schools in the surrounding communities of Burlington, Lexington, Reading, Stoneham, Wilmington and Winchester to see if any students who resided in Woburn had been diagnosed with type 1 diabetes.

III. Results

For each child with type 1 diabetes, information reported to the MDPH included: age of onset, date of onset, current age, school district where child resided at onset, and school where the child was currently enrolled. Based on information from the school nurses contacted by the MDPH, a

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total of 16 children enrolled in a school in Woburn have type 1 diabetes. Fifteen of the 16 children are currently attending the Woburn Public Schools and one child is a student at the private elementary school in Woburn. No Woburn children enrolled in private schools in communities surrounding Woburn were identified as having a diagnosis of type 1 diabetes. Diagnosis information is presented below which evaluates the 16 children by two distinct groups: 1) children diagnosed with type 1 diabetes prior to entering school, and 2) children diagnosed after enrolling in a Woburn school.

1. *Children Diagnosed Prior to Entering School*

Nine of the 16 children currently enrolled in a Woburn school were diagnosed with type 1 diabetes before entering school (See Figure 1). The majority of these children (n = 8) were diagnosed with type 1 diabetes during the time period 1992 – 2000 while one child was diagnosed in 2004.

According to information reported to the MDPH from the school nurses, all nine children had a family member with a diagnosis of type 1 diabetes. Within this group of nine children, there were two different sets (i.e., 4 children total) of siblings diagnosed with type 1 diabetes. Another child had an older sibling (diagnosed while in school) who had been diagnosed with type 1 diabetes. For the remaining four children, the Woburn school nurse did not specify which relative of each child had type 1 diabetes.

Two of the nine children who were diagnosed with type 1 diabetes before entering school are currently enrolled at the Goodyear Elementary School.

2. *Children Diagnosed After Enrolling in a Woburn School*

Seven of the 16 children with type 1 diabetes were diagnosed after entering a school in Woburn. All seven were diagnosed during the time period 2000 – 2004 (See Figure 1).

According to information provided to the MDPH, one child had no family members diagnosed with type 1 diabetes, and it was unknown if two of the other six children had family members with type 1 diabetes. The remaining four children with type 1 diabetes had a family member

diagnosed with type 1 diabetes. Two of these four children were siblings, one child had a younger sibling (diagnosed before entering school) and it was unknown for the fourth child which relative had diabetes.

Five of the seven children were enrolled at the Goodyear Elementary school at the time of diagnosis. Three of these five children had a family member with type 1 diabetes. Of these three, two were siblings and the third child also had a sibling diagnosed with type 1 diabetes. For the remaining two children, no information was available that suggested other relatives being diagnosed with type 1 diabetes. It is important to note, however, that the diagnoses of these two children were more than three years apart.

IV. Discussion

Type 1 diabetes is thought to be an autoimmune disease and is not currently preventable. The cause of most autoimmune diseases is not completely understood, although they are thought to arise through a complex combination of genetic and environmental factors. In individuals with diabetes, the immune system attacks the insulin-producing beta cells in the pancreas and destroys them. Although type 1 diabetes usually develops in children and young adults, it can occur at any age. Many studies done in families and twins have shown that genes play a role in the development of type 1 diabetes. Siblings of patients with type 1 diabetes have a 6-10% risk of developing this disease in their lifetime while up to 70% of twins with type 1 diabetes will ultimately develop the disease themselves. To the medical community, this indicates that while genes clearly play a strong role, non-genetic factors (i.e., an environmental trigger) must also be involved. Possible candidates include environmental exposures (such as diet), and infectious agents (such as viruses). However, no specific environmental/non-genetic trigger has been identified.

According to prevalence information from the American Diabetes Association, approximately one in every 400 to 500 children and adolescents (i.e., age 0-19) has type 1 diabetes. If we apply this recent prevalence estimate to the population of children (i.e., age 0-19) in Woburn (based upon 2000 U.S. census data), we would expect to see between 17 and 21 children in Woburn with type 1 diabetes. According to information contained in student health records, there are

currently 16 children enrolled in the Woburn schools with type 1 diabetes. Efforts to identify cases also involved discussion with school nurses in surrounding communities. No Woburn children enrolled in private schools in communities surrounding Woburn were identified as having a diagnosis of type 1 diabetes. Four of the sixteen children in the Woburn schools with type 1 diabetes were diagnosed in 2004. The diagnosis of the 12 other children was fairly evenly distributed throughout the 12 year time period 1992 – 2003.

Of the 16 children identified, seven were diagnosed after entering a Woburn school. Review of information provided to the MDPH revealed that five of these seven children were diagnosed with type 1 diabetes after attending the Goodyear Elementary School, three of whom had a relative with type 1 diabetes. The other two children's diagnoses were more than three years apart, and therefore it is unlikely that a common environmental exposure connects these two individuals. However, while genetics appears to have played an important role in the incidence of type 1 diabetes, the number of children diagnosed more recently in the community (n = 4) is higher than in previous years. For that reason, it may be important to continue working with school nurses in Woburn to monitor incidence patterns in the future.

V. Conclusions

The information contained in this report found a total of 16 school children in Woburn with type 1 diabetes, seven of whom attended Woburn schools at the time of diagnosis. Efforts to ascertain cases also included outreach to school nurses in surrounding communities. Five of the seven children diagnosed while enrolled in the Woburn schools were students at the Goodyear Elementary School. Three of these children had a family member diagnosed with the disease and two did not based on information available. It is important to note, however, that the diagnosis dates for these two children was more than three years apart, suggesting that environmental factors at the Goodyear School alone had not played a primary role in the incidence of type 1 diabetes.

Information reported to the MDPH, however, did suggest that the number of children diagnosed in the calendar year 2004 was more than all previous years evaluated (i.e., 4 versus 1-2 per year). For that reason, it may be prudent to monitor the incidence patterns in the future.

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VI. Recommendations

1) The MDPH will work with the Woburn school nurses to continue to monitor the number of children in the Woburn schools with type 1 diabetes during the next school year (2004 – 2005).

2) Staff from the Department's Emergency Response/Indoor Air Quality Program (ER/IAQ) will conduct an evaluation of indoor air quality (i.e., ventilation system, potential sources of mold and other microbial agents, presence of allergens) at the Goodyear Elementary School. The ER/IAQP conducts assessments of public buildings, such as schools, throughout Massachusetts in order to determine whether conditions at the school are affecting indoor air quality and may be contributing to symptoms among the building occupants. While the pattern of type 1 diabetes does not suggest that the school environment has played a primary role in the incidence of the disease, there may be environmental issues that warrant further action. The findings of the ER/IAQP evaluation will be considered in context with our current review of students diagnosed with type 1 diabetes.

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VII. Bibliography

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FIGURE 1
School Children Diagnosed with Type 1 Diabetes (T1D) in Woburn, MA