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An Aggregate-Based Diabetes Prevention Project

Assessment

The at-risk population in this project is high school students (generally teens ages 14-19) at a particular high school in Ann Arbor, MI. The total student population is 2,868 students. Out of these, 753 are in the 9th grade (generally age 14-15), 738 are 10th grade (generally age 15-16), 766 are in the 11th grade (generally age 16-17), and 611 are in the 12th grade (generally ages 17-18). 0.3% are Native American, 66.1% are Caucasian, 2.7% are Latino, 14.9% are African-American, 8.9% are Asian, 1.7% are Middle Eastern, 2.4 percent are Multi-ethnic, and 3.1% are categorized as “Other.” Finally, 50.7% are male and 49.3% are female (Ann Arbor Public Schools, 2004).

According to the school nurse at the high school, health problems facing this population include panic disorder, overweight/obesity, teenage pregnancy, smoking, alcohol abuse, and diabetes (R. Mancini, personal communication, February 21, 2008). These issues are validated as top problems for this age group in general by many studies, including one from the University of Michigan four of these issues among the top 10 faced by teenagers (C.S. Mott Children’s Hospital, 2007).

Based on input from the school nurse, this project will focus on diabetes among adolescents. There are several types of diabetes: Type I, Type II, Gestational, and Pre-Diabetes (American Diabetes Association, n.d.). This project will focus on the two main types: Type I and Type II. 7% of the U.S. population has diabetes. Approximately one-third of these patients are undiagnosed. In children and adolescents, the prevalence is one in every 400-600 with Type I. 2,000,000 adolescents and one in six overweight adolescents have Type II diabetes. Trends suggest that this number is growing (American Diabetes Association, n.d.). In 2002, the estimated annual economic cost of diabetes was \$132 billion (CDC, 2006). In 2005, the

incidence of diabetes was 1.5 million cases in the United States—numbers specific to the teenage population were not available (National Diabetes Information Clearinghouse, 2005).

It is believed that Type I diabetes develops in three stages: genetic susceptibility, autoimmunity, and clinical diabetes. The specific factors, including genetic factors, that lead up to clinical disease are not well understood. What is known is that the body destroys the islet cells of the pancreas, leading to a complete inability to produce insulin (National Diabetes Information Clearinghouse, 2005). Once this occurs, the body loses the ability to handle glucose, and symptoms begin to develop “out of the blue.” Severity of symptoms can vary by patient, but classic symptoms include increased thirst, increased urination, weight loss despite increased appetite, nausea, vomiting, abdominal pain, fatigue, and absence of menstruation. Once the disease is present, it must be managed—there is no cure and it does not go away. Individuals with Type I diabetes must use insulin to regulate their blood sugars, and diet and exercise must be monitored to support stable blood sugar (Zieve, 2007).

Type II diabetes is also not fully understood. However, it begins with “pre-diabetes” which is a “stage of mild postprandial hyperglycemia” (Ramlo-Halsted & Edelman, 2000). At this stage, it is possible to reverse the progression of the disease with weight loss and lifestyle modification. However, if the disease progresses, there are three metabolic problems involved: insulin resistance, defective insulin secretion, and increased glucose production from the liver. This leads to a slow progression of increasing blood glucose levels, and the symptoms are often elusive or even absent. If symptoms are present, they may include all of the Type I symptoms as well as blurred vision, frequent or slow-healing wounds and infections, and erectile dysfunction. While there is no cure for Type II diabetes, treatment is more varied than for Type I. Depending on the severity and the patient’s response to treatment, people with Type II diabetes are typically

treated with diet and exercise modifications, careful blood glucose monitoring, weight control, and sometimes oral medication. Rarely, those with progressed or treatment-resistant disease need to use some supplemental insulin (Stacy, Eltz, & Juhn, 2007).

The exact determinants of diabetes are not fully known. Currently, research studies are underway to discover more about the causes of the disease, including one international multi-center study regarding determinants of diabetes in children (U.S. National Institutes of Health, 2008). Theories about the determinants of diabetes include: family history, history of gestational diabetes (for women), high-fat diet, low activity level, early childhood exposure/infection with certain viruses, in utero exposure to certain illness, weight, exposure to environmental factors such as drinking water or allergens, and increased psychological stress (U.S. National Institutes of Health, 2008).

Limited data is available on the risks of diabetes in students at this high school as compared with other areas. However, it is known that individuals of non-Caucasian race are more likely to develop diabetes (National Diabetes Information Clearinghouse, 2005). When using race to compare risk, this high school appears to be at lower risk than the nation with more black people but less Native Americans and Hispanics. It is also at a lower risk than the state of Michigan, with lower percentages of all minority populations. Racial distribution at the high school is nearly identical to that of the county (U.S. Census Bureau, 2000).

There are five *Healthy People 2010* objectives that relate to adolescent diabetes. These are: “Reduce hospitalization rates for three ambulatory-care-sensitive conditions—pediatric asthma, uncontrolled diabetes, and immunization-preventable pneumonia and influenza,” “Reduce kidney failure due to diabetes,” “Increase the proportion of persons with diabetes who

receive formal diabetes education,” “Prevent diabetes,” and “Reduce the overall rate of diabetes that is clinically diagnosed” (U.S. Department of Health and Human Services, 2008).

Resources in the community include a multitude of private medical clinics, at least one free clinic, two large health systems including one University health system, and a comprehensive diabetes center within the University health system. This population also has free access to a school nurse to help with their health concerns. Barriers of service to this population include age (they cannot give consent for medical care, and may not be able to transport themselves), income and/or insurance level for some, and a low knowledge level regarding diabetes.

Intervention objectives

The intervention will be an educational bulletin board located in a main hallway of the high school. This was suggested by the school nurse and was felt to be appropriate because it would be highly visible and the students will not have to spend a lot of time in order to be educated about diabetes. Cognitively, objectives include helping students understand the symptoms of diabetes and of hypo- and hyper-glycemia as well as providing resources for those with concerns. Affectively, we hope that by increasing students’ understanding of diabetes, we can reduce their prejudicial feelings about the disease (the injections are gross, etc.). We also hope to raise their feelings of compassion for their peers who suffer from the disease. Psychomotor objectives were not as heavily included; however, we did include a section on exercise in order to help students change their fitness behaviors if they are interested.

Plan for implementation and evaluation

The project will be an educational poster to be displayed outside the nurse’s office at the high school. This poster was developed over two weeks’ time and will be displayed for

approximately a month, depending on the needs for bulletin board space for other projects. The project will be evaluated qualitatively by word-of-mouth from staff and students, and also by keeping a count of how many information sheets are taken (sheets will be left under that poster and will contain a summary of the information presented). This project is mostly a secondary and tertiary prevention project, as it focuses on symptoms of diabetes and symptoms of complications in diabetics; however, there is some information of healthy exercise, which can prevent type II diabetes and so would be primary prevention. This project already has approval to be displayed. A small budget is needed for the materials for the board as well as copying costs for the information sheet. The project took approximately 8 hours to develop and another 2-3 hours to make into a display. We hope that the poster will meet the objectives in the ways listed above.

Evaluation

Evaluation of the project is still in progress as the display was just put up several weeks ago. Preliminary verbal evaluations from the school nurse and a few students have been positive. We are hopeful that the objectives will be met; we feel that the poster provides the information necessary for students to meet the objectives if they so desire. The strengths of this project were that it was easy to implement and required few resources. Weaknesses of the intervention include the fact that it is highly dependent on student motivation and ability to stop and read it, and also that it is difficult to sum up such a complex condition in a simply display. If the project were done again, it might be more effective to have a series of displays in order to more effectively communicate all the important information about diabetes—i.e. one display about symptoms and causes, and one display about complications of diabetes and life for

diabetics. It would also be nice to have more visuals—perhaps examples of insulin syringes or pictures of blood glucose meters, or more detailed anatomical pictures.

One other change that could be made to the project is a more comprehensive evaluation. The selected evaluation method is the most practical to use with this type of intervention; however, if this were a pressing, critical matter, there are several ways we could better evaluate whether the objectives were met: we could have students complete surveys regarding any change in their physical activity patterns and also in their knowledge level, and we could have administered pre- and post-tests to the target population to ensure that the cognitive and affective objectives were met. However, these methods would have required more investment of time and also considerably more resources in terms of gaining approval (i.e. having teachers agree to let their students be surveyed during class time).

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