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Diabetes: An ongoing challenge in the schools

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ABSTRACT

Diabetes is an ever-increasing disease that consumes a large amount of medical professional time and requires a good deal of education on the part of the patient/student, and often constant monitoring and vigilance of blood sugar levels. This paper cursorily reviews the two types of diabetes and discusses the emotional and physical toll that this disease. Contemporary treatment approaches are discussed (diet, exercise) and ongoing concerns for school personnel are reviewed.

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Diabetes

The very word is almost akin to cancer for those who have been identified with diabetes and their families. In a Centers Disease and Control and Prevention 2015 Diabetes Surveillance System and National Health Interview, there were about 193,000 were children and adolescents younger than age 20 [1]. Studies have shown the majority of school staff members have an inadequate understanding of diabetes. Consequently, diabetes education must be targeted toward teachers and other school staff who interact with the student, including school nurses, administrators, coaches, health aides, bus drivers, secretaries, etc. [2,3].

Current ADA recommendations and resources regarding appropriate care for students with diabetes are available to all school staff [4]. In the Elementary Schoolteachers' Understanding of Diabetes study, only twenty-six percent of the teachers in the study felt they had been adequate training. Ninety-one percent of the respondents expressed some interest in learning more about diabetes, especially if their class or they would be responsible for the child with diabetes [3].

Each child with diabetes while having similar symptomologies is an individual with varied specific needs special to the child. Typically, the parent alerts the school of the child's need. The amount of education the teacher or assistant includes understanding of the early signs, juvenile diabetes, and the largest population, Type II diabetes.

For students and others, one of the main goals and objectives of treating diabetes is to help students understand and lower their blood sugar to help them reach what is called an "A1C goal." The A1C test is a common blood test used to diagnose type 1 and type 2 diabetes and to monitor how well you're managing your diabetes. The A1C test goes by many other names, including glycated hemoglobin, glycosylated hemoglobin, hemoglobin A1C and HbA1c. Further, cholesterol should also be evaluated and measured on an on-going basis. High school and even junior high students and parents need to be aware of the "A1C" idea [5].

There is an A1C test that evaluates the average amount of sugar in a student's blood over the past few months (typically 2-3months). There are guidelines from various organizations, but the American Diabetes Association indicates that a A1C goal of less than 7 percent is suggested for some adults with diabetes- however this should be adjusted by health care personnel taking into account height, weight, sex, age, and various other factors. The "C" in A1C represents cholesterol, and there are two types- LDL and HDL, with LDL representing low-density lipoprotein and HDL stands for High density lipoprotein. (some people refer to LDL- as "lousy" cholesterol and HDL as healthy.) It is "lousy" because it blocks blood vessels [5].

Early signs

Early signs of children who have not been identified will often report being constantly hungry and or tired, or possibly passing out. In the schools, children may want to go to the bathroom to urinate more frequently than other students. They also want to make more trips to the water fountain as they are quite often thirsty. Teachers may see them scratching and complain of having a "dry mouth". Other students may indicate difficulty with their vision- that things are blurry. Some students manifest "mood swings" or "mood changes". Often these students are sent to the counselor or even referred for evaluation for emotional or behavioral disorders. And if the condition is not recognized and treated, these mood swings can become problematic in interpersonal relations as well as in later marital relationships. With older students, the illusion of smoking or drugs. While smoking overall has somewhat decreased, other noxious, heinous forms of "smoking" and inhaling have appeared, causing consternation to parents, teachers, nurses, and health professionals. Students may also attempt to use the 6 hour "energy boosters" in lieu of a good breakfast and they may "crash" or become lethargic or lazy later in the day.

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Type I

Type I Diabetes is most frequently diagnosed during the teenage years. During adolescence, there are often other self-esteem, self-concept issues as well as adolescent sexual preoccupation. Thus, diabetes is yet another thing for the student to attempt to cope with as well as academic demands. If they have to periodically test their glucose, they may encounter teasing from other students and may attempt to hide the diagnosis.

Type II

Type II Diabetes, according to the Center for Disease Control and Prevention has not doubled, tripled but has quadrupled over the last 30 years (2015). Apparently, there are about 3,600 new cases a year. In the United States as well as in other countries- there are other issues such as obesity, hay fever, allergies, and asthma, which are of concern. The United States is a nation of sugary soft drinks and candy, with soda dispensing machines around every corner.

As school enrollments grow, so do the health care needs of children in schools. Unfortunately, there has not been an equivalent increase in the supply of school nurses, and in fact, many schools operate without full-time school nurses largely due to budgetary restraints. Individual attention to students is often not possible. Clearly, diabetes management in school requires a multilevel approach.

Even if your child has access to a full-time school nurse, the 24/7 nature of diabetes requires that your child and all of his/her caregivers are ready to respond to routine or emergency care needs - e.g., field trips, athletic/sporting events, bus rides to and from home, etc. Open and frequent communication between the child, parents and school personnel is essential to the child's success - scholastically, socially and in terms of his/her diabetes management outcomes. And since kids spend nearly half their waking hours in school, reliable diabetes care during the school day really matters. The school nurse is quite often the most knowledgeable person in the school and is the key person to consult regarding the students' need for occasional rest and breaks, but due to extenuating circumstances, many schools do not have access to a full-time nurse, or possibly a district nurse provides information to the principal and/or counselor, but rarely onsite. The school site and teacher need to know some basics of diabetes beyond the day-to-day needs [6].

The seriousness of diabetes cannot be under-estimated. If the diabetes is not brought under control- there are later concerns about high blood pressure, blindness, amputation, and heart and kidney problems. Some individuals will have to continually check their feet and extremities on an ongoing basis [7]. Long-term complications of diabetes develop gradually. The longer a person/child have diabetes and the less controlled the blood sugar — the higher the risk of complications. Eventually, diabetes complications may be disabling or even life-threatening. According to the Mayo Foundation for Medical Education and Research [8]. The possible complications include:

Cardiovascular disease

Diabetes dramatically increases the risk of various cardiovascular problems, including coronary artery disease with chest pain (angina), heart attack, stroke and narrowing of arteries (atherosclerosis). If you have diabetes, you are more likely to have heart disease or stroke.

Nerve damage (neuropathy)

Excess sugar can injure the walls of the tiny blood vessels (capillaries) that nourish your nerves, especially in your legs. This can cause tingling, numbness, burning or pain that usually begins at the tips of the toes or fingers and gradually spreads upward.

Left untreated, you could lose all sense of feeling in the affected limbs. Damage to the nerves related to digestion can cause problems with nausea, vomiting, diarrhea, or constipation. For men, it may lead to erectile dysfunction.

Kidney damage (nephropathy)

The kidneys contain millions of tiny blood vessel clusters (glomeruli) that filter waste from your blood. Diabetes can damage this delicate filtering system. Severe damage can lead to kidney failure or irreversible end-stage kidney disease, which may require dialysis or a kidney transplant.

Eye damage (retinopathy)

Diabetes can damage the blood vessels of the retina (diabetic retinopathy), potentially leading to blindness. Diabetes also increases the risk of other serious vision conditions, such as cataracts and glaucoma.

Foot damage

Nerve damage in the feet or poor blood flow to the feet increases the risk of various foot complications. Left untreated, cuts and blisters can develop serious infections, which often heal poorly. These infections may ultimately require toe, foot, or leg amputation.

Skin conditions

Diabetes may leave you more susceptible to skin problems, including bacterial and fungal infections.

Hearing impairment

Hearing problems are more common in people with diabetes.

Alzheimer's disease

Type 2 diabetes may increase the risk of dementia, such as Alzheimer's disease. The poorer your blood sugar control, the greater the risk appears to be. Although there are theories as to how these disorders might be connected, none has yet been proved.

Depression

Depression symptoms are common in people with type 1 and type 2 diabetes. Depression can affect diabetes management. Mayo Foundation for Medical Education and Research [8].

Therefore, unmanaged diabetes must be addressed. In the schools, there are often students with other intellectual issues, anxiety, eating disorders who have diabetes. They may have a learning disability and not be able to read instructions or pamphlets distributed by a local nurse or physician's assistant. Thus, these students need a mature, responsible, reliable dependable adult, such as the school nurse to do oversee or perform periodic checks on the child's glucose. There have

been some advances and improvements in different ways to monitor glucose levels.

A person in the schools who spends the most time with the child with diabetes should be determined with all folks who will have the child in their care such as the teacher, bus driver, PE teacher, Coach, band teacher, educational assistants, speech therapists, O.T.'s and P.T.'s for a minimal list, there has to be some recognition that the age of the child is a major factor. Some guidelines follow:

Young children (<5 years of age): unable to perform diabetes tasks independently and will need an adult to provide all aspects of diabetes care. Many younger children will have difficulty in recognizing hypoglycemia, so it is important that school staff recognize and provide prompt treatment. However, children in this age range can often choose which finger to prick and select an injection site and are generally cooperative. ADA's position statement on childcare "Care of Young Children With Diabetes in the Child Care Setting" (National Institutes of Health, 2006). should be reviewed for more information.

Elementary students: depending on the duration of diabetes and level of maturity, may be able to perform their own blood glucose checks, but usually will require supervision. Older elementary students are generally beginning to self-administer insulin with supervision and understand the effect of insulin, physical activity, and nutrition on blood glucose levels. Unless the child has hypoglycemia unawareness, he ,or she should usually be able to let an adult know when experiencing low blood glucose.

Middle school– and high school–aged students: are usually able to self-manage their diabetes depending on the duration of diabetes and level of maturity but will always need help when experiencing severe hypoglycemia. Independence in older youth should generally be encouraged to enable the student to engage in his or her decisions about his or her own care. Some schools have attempted to provide well balanced, nutritious lunches, but there are always students who will sneak off campus to get fast food at some local restaurant.

College–aged students: Even in college, there are students who are still attempting to manage their diabetes, and have not as yet found any equilibrium in terms of balancing diet, exercise, and sleep as well as the myriad other activities (part time work) that college students engage in. Further, there are always financial concerns that impact their daily lives.

Diabetes can impact every aspect of a person's life. They may continually need to use caution when driving a motor vehicle, they may need to have several small meals instead of 3 large meals and may need to ensure that they get adequate rest and vitamins, proteins, minerals, and the like [3].

Attendance and absenteeism

Students with diabetes may be frequently absent for various reasons at all levels. Teachers need to plan ahead for such circumstances and realize that these absences are beyond the control of the student- and that there may be occurrences where a student may simply not feel well or lack the energy to get out of bed and get to school.

Depression and anxiety

Although increased rates of disturbed eating behaviors (DEB), depression, and anxiety in type 1 diabetes (T1D) are generally reported, data on males and older females is lacking. The Wisting et al. [9] study examined frequency of DEB, depression, and anxiety among 282 adult males and females with T1D across a wide age span. Approximately one-fifth of the participants (and a quarter of all females) scored above cut-off for DEB, 6.2% scored above cut-off for depression, and 19.0% for anxiety. The prevalence was generally higher in females than males across all psychopathology. HbA1c (a measure of long-term blood glucose levels) was significantly associated with DEB, but not with depression and anxiety. Symptoms of DEB decreased with increasing age, and when our previous reported data from children and adolescents are included, a peak in levels of DEB during late adolescence and young adulthood was observed. Therefore, increased awareness of psychological comorbidity among adults with T1D is warranted, especially among young adult females [9].

Accommodations and modifications

Students who have what is termed "juvenile diabetes" or Type II can sometimes be successful in school without any major accommodations or modifications. However, depending on the age of the child and the severity of the condition, schools must provide reasonable accommodations and modifications. In some instances, they will require a Section 504 plan to allow them to monitor their glucose, insulin injections, food, water, the restroom. Some students may only need assistance at very specific times- for example in physical activities or competitive sports. These obviously vary from situation to situation and there must be some reasonable documentation as to the needs of the child. Students should also drink plenty of liquids to avoid dehydration during the summer months when it is hot and humid. Football players, particularly since they have bulky uniforms may need to exercise caution. Schools need to be vigilant in cases where a teacher may be absent, and a substitute teacher may need to be aware of those accommodations and or modifications.

Field trips

Some school encourage field trips but the teacher, the educational assistant and the student needs to be well prepared. Some field trips are brief and to a local museum, and others could present challenges (such as a trip to the Grand Canyon). It may be better for some children to take a video trip or look at other alternatives- since medical intervention may be quite limited or distant.

Imperative points

Imperative points regarding children with diabetes in the schools The American Diabetes Association (2020) has indicated the following imperative points regarding children with diabetes in the schools. There should be a DMMP- Diabetes Medical Management Plan, which contains the following:

1. Blood glucose monitoring, including the frequency and circumstances requiring blood glucose checks, and use of continuous glucose monitoring, smartphone and smartwatch applications, or other technology, if applicable.

2. Insulin administration (if necessary) using the student's preferred insulin delivery system, including doses/injection times prescribed for specific blood glucose values and for carbohydrate intake, the storage of insulin, and, when appropriate, physician authorization of parent/guardian adjustments to insulin dosage.
3. Meals and snacks, including food content, amounts, and timing.
4. Symptoms and treatment of hypoglycemia (low blood glucose), including the administration of glucagon if recommended by the student's health care provider.
5. Symptoms and treatment of hyperglycemia (high blood glucose), including the administration of insulin if recommended by the student's health care provider.
6. Checking for ketones and appropriate actions to take for abnormal glucose and ketone levels, if requested by the student's health care provider.
7. Participation in physical activity.
8. Emergency evacuation/school lockdown instructions and emergency contacts and plans.

The parent or guardian of the child does have certain specific responsibilities. The parent or guardian must provide the school with the following items:

1. All materials, equipment, supplies (meter, test strips, lancets, lancing device), insulin (backup syringes, pump supplies, etc., if needed), and other medication necessary for diabetes management, including blood glucose monitoring, insulin administration (if needed), glucose tablets, glucagon emergency kit, urine or blood ketone monitoring, and food/snacks. The parent/guardian is responsible for the maintenance of the blood glucose monitoring equipment (i.e., cleaning and performing controlled testing per the manufacturer's instructions) and must provide materials necessary to ensure proper handling and disposal of materials. An appropriate record-keeping system should be maintained at school, enabling staff or student to record blood glucose and ketone results; blood glucose values should be transmitted to the parent/guardian for review and presented in the DMMP. Some students maintain a record of blood glucose results in the meter memory or through other electronic means.
2. The DMMP completed and signed by the student's health care provider.
3. Supplies to treat hypoglycemia, including glucose tablets or a source of quick-acting carbohydrate and a glucagon emergency kit.
4. Information about diabetes and the performance of diabetes-related tasks such as blood glucose monitoring and insulin administration.
5. Current emergency phone numbers for the parent/guardian and the student's health care provider so that the school, with parental consent, can contact these individuals with diabetes-related questions and/or during emergencies.
6. Information about the student's meal/snack schedule. The parent should work with the school before the beginning of the school year or before the student returns to school after the diagnosis to coordinate this schedule with that of the other students as closely as possible. Instructions should be given for situations when food is provided during school parties and other activities.
7. In most locations, and increasingly, a signed release of confidentiality limited to diabetes-related care will be required so that the health care provider can communicate with the school. Copies should be retained both at the school and in the health care provider's offices (Jackson, et al., 2018).

Training for school staff

By the same token, the school has certain obligations and must be involved in providing for the following:

1. Opportunities for the appropriate level of ongoing training and diabetes education for the school nurse and school district health care coordinators.
2. Training for school staff as follows:

a. **Level 1** training for all school staff members, which includes a basic overview of diabetes, typical needs of a student with diabetes, recognition of hypoglycemia and hyperglycemia, and the contact information for help.

b. **Level 2** training for school staff members who have responsibility for students with diabetes, which includes all content from level 1 plus recognition and treatment of hypoglycemia and hyperglycemia and required accommodations for those students.

c. **Level 3** training for a small group of school staff members who will perform student-specific routine and emergency care tasks such as blood glucose monitoring, insulin administration, and glucagon administration when a school nurse is not available to perform these tasks. This will also include level 1 and level 2 training.

3. Immediate accessibility to the treatment of hypoglycemia by a knowledgeable adult. The student should remain supervised until appropriate treatment has been administered, and the treatment should be available as close to where the student is as possible.
4. Accessibility to scheduled insulin at times set out in the student's DMMP and immediate accessibility to treatment for hyperglycemia including insulin administration as set out by the student's DMMP.
5. A location at school that allows privacy during blood glucose monitoring and insulin administration, if desired by the student and family, or permission for the student to check his or her blood glucose level and take appropriate action to treat hypoglycemia and hyperglycemia in the classroom or anywhere the student is in conjunction with a school activity, if indicated in the student's DMMP.
6. School nurse and trained school staff who can check blood glucose and ketones and administer insulin, glucagon, and other medications as indicated by the student's DMMP.

7. School nurse and trained school staff responsible for the student who are aware of the student's meal and snack schedule and work with the parent/guardian to synchronize this schedule with that of the other students. This individual will also notify the parent/guardian in advance of any expected changes in the school schedule that affect the student's meal times or exercise routine and will remind young children of snack times.
8. Permission for self-sufficient and capable students to carry equipment, supplies, medication, and snacks and to perform diabetes management tasks anywhere and at any time.
9. Permission for the student to have smartphone or other technology and direct communication access to reach the parent/guardian and health care provider and document treatment.
10. Permission for the student to see the school nurse and other trained school staff as often as requested.
11. Permission for the student to eat a snack anywhere, including the classroom or the school bus, if necessary, to prevent or treat hypoglycemia.
12. Permission to miss school without consequences for illness, diabetes management, and required medical appointments to monitor the student's diabetes management. This should be an excused absence with a doctor's note, if required by usual school policy.
13. Permission for the student to use the restroom and have access to fluids (i.e., water) as necessary.
14. An appropriate location for insulin and/or glucagon storage, if necessary.
15. A plan for the disposal of sharps based on an agreement with the student's family, local ordinances, and Standard Precautions.
16. Information on serving size and caloric, carbohydrate, and fat content of foods served in the school (Jackson, et al., 2018).

Conclusion

This paper has cursorily attempted to review a relevant, salient topic for school personnel- diabetes. Diabetes is a true medical condition and teachers, counselors, principals should learn all they can about this disorder/disease in order to be prepared for any emergencies or difficulties.

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