Hypoglycemia Awareness Training
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What is This?
For individuals with diabetes, hypoglycemia is a fact of life.

People with type 1 diabetes are reported to experience an average of 2 mild hypoglycemic episodes each week, and individuals with insulin-treated diabetes may experience at least 1 episode of severe hypoglycemia each year. The costs for the management of hypoglycemia are enormous. Direct costs are related to increased emergency department (ED) visits, hospital admissions, and longer hospital stays, and indirect costs are due to patients maintaining higher levels of blood glucose to avoid all hypoglycemia resulting in more complications, vehicular accidents due to driving while hypoglycemic, absenteeism and presenteeism from work, and overall decreased quality of life. At least 1 study has shown that over a 12-month period, 7% of people with insulin-treated diabetes experienced a low blood glucose reading that required emergency assistance.

**Hypoglycemia Awareness Training**

While a general discussion of hypoglycemia signs, symptoms, and treatment should be a routine part of an assessment for anyone using an antihyperglycemic agent with a high risk of hypoglycemia (SU, glinides, insulin), once hypoglycemic events are recognized as a pattern, there should be more emphasis placed on increasing awareness of the signs and symptoms as well as prevention of hypoglycemia with those individuals.

Benefits from such a program to help patients detect possible hypoglycemia earlier include:

- Preventing severe hypoglycemia from occurring by being proactive upon the first signs of a low blood glucose reading.
- Reducing the fear of hypoglycemia events being unavoidable and uncontrollable. Fear of hypoglycemia may drive up A1C values as much as the actual events.
- Improving quality of life for not only the person with diabetes but also those close to him or her.
- Preventing accidents while driving due to low blood glucose impairing cognitive functions and reaction times.
- Preventing further episodes of hypoglycemia from occurring.

People who have a hypoglycemic event increase their risk of having another event for up to 2 days following the initial episode. Studies show that repeated hypoglycemic events impair the body’s ability to react to further hypoglycemic events, thus creating a vicious cycle for the patient. The normal counter-regulatory defense mechanism that is triggered upon occurrence of low blood sugar to release counter-regulatory hormones, including epinephrine, which is responsible for the classic sympathetic nervous system symptoms of palpitations, sweating, and anxiety that are most commonly associated with hypoglycemia, are blunted or greatly reduced. The result can be total hypoglycemic unawareness, or loss of the early warning signs and symptoms of hypoglycemia, which makes tight control almost impossible for the patient. The result is a loss of consciousness being the first and only sign that blood glucose has dropped to dangerously low levels.

Possible candidates for low blood glucose awareness therapy are those with a history of recurrent hypoglycemia, impaired awareness of hypoglycemia, or complete hypoglycemia unawareness. The American Association of Clinical
Endocrinologists recommend encouraging all people with diabetes who drive motor vehicles, who have high-risk occupations, or those whose leisure time involves high-risk activities to participate in an education program with emphasis on hypoglycemia recognition, prevention, and treatment. Through this program, patients and their relatives are trained to recognize subtle cues and indicators of oncoming hypoglycemia and respond to them before the occurrence of a disabling hypoglycemic episode.

Components and key teaching points of a hypoglycemic awareness program should be individualized to the patient and be based on motivational interviewing techniques that allow patients to discover and arrive at their own solutions as much as possible.

Possible topics to be covered and discussed in a comprehensive hypoglycemic awareness program should include the following.

**The Importance of Using Frequent Monitoring to Show “Cause and Effect” of Daily Lifestyle Choices in Relation to Blood Glucose Patterns**

One of the AADE7 Self-Care Behaviors™ emphasizes problem solving for optimum diabetes self-management. A thorough review of a detailed blood glucose log filled in by the patient should be done at each visit with an interest in looking for patterns. The log should contain entries for times and amounts of insulin doses, carbohydrate intake, physical activity, and circumstances surrounding recent episodes of hypoglycemia while including feelings, emotions, and performance of day-to-day tasks. These events should be discussed together with information regarding the earliest awareness or signs the patient noticed of hypoglycemia occurring. Combining this information with the patient’s personal experience, it’s possible to predict the times of the day when there could be a higher risk for hypoglycemia and where closer attention should be paid to early warning signs or more frequent checking performed.

**Increasing Awareness of Hypoglycemic Triggers as Well as Recognition of Some of the Subtler Signs of Low Blood Glucose**

By reviewing the earliest signs that occur when a hypoglycemic event occurs with the patient, it’s possible to uncover unique symptoms that precede an event that the patient was not aware of (taste, smell, numbness) or in other cases help the patient to recognize the earliest classic signs that warn of low blood glucose, whether in the form of the adrenergic signs of shaking, fast heart rate, sweating, or tingling or the neuro-glycopenic symptoms of hunger, headache, blurred vision, or becoming tired or drowsy. Research has shown that a common reason patients progress from mild to severe hypoglycemia is that they recognize the symptoms but prolong treatment, attribute the symptoms to other activities, or don’t connect the symptoms with oncoming hypoglycemia.
Helping patients to connect what they are personally experiencing with the timing of hypoglycemic events could possibly decrease the frequency and intensity of future events. Monitoring key everyday performances may also serve as an indicator of low blood glucose levels. Patients should be made aware that during times of low blood glucose, common tasks may become more difficult, such as the ability to read may become harder, tactile functions such as picking up or holding items could possibly decrease, keyboarding could become more difficult with a greater number of errors, and so on. The objective of this type of review with patients is to help them become more aware of what is happening to their bodies giving them enough warning to stave off a more severe hypoglycemic episode. Of course, any opportunity for verification by a blood glucose meter is encouraged and necessary.

A Thorough Understanding of Insulin to Carbohydrate Ratios and Correction Factors

The obvious way to avoid severe hypoglycemic reactions is to not allow them to occur to begin with. By providing the patient with a better understanding of the insulin–carbohydrate–physical activity relationship, many episodes of hypoglycemia can be avoided altogether. Increasing the time between occurrences also serves to increase patient sensitivity to the signs of low blood glucose. Research shows that if a patient can avoid having hypoglycemia occur over a period of time as short as 2 to 8 weeks, many of the warning signs and symptoms of hypoglycemia can be restored, even for those patients with hypoglycemic unawareness. It may be necessary to raise pre- and post-meal goals in an effort to completely avoid hypoglycemic events for this period of time. Training also needs to be focused on a good understanding of individualized insulin to carbohydrate ratios and correction factors, with the patient working through several scenarios to demonstrate the ability to adjust insulin doses as necessary. There should also be a clear understanding of individualized insulin to carbohydrate ratios and correction factors. Knowing how long their insulin effectively lasts (duration of action) is also a key issue in preventing low blood glucose and anticipating drops in blood glucose. A blood glucose of 65 mg/dl 4 hours after injecting insulin is entirely different from a 65 mg/dl reading 1 hour after injecting with no meal planned for several hours.

Recognition of Ability to Drive

Every discussion concerning hypoglycemia and low blood glucose awareness should include how the patient makes choices about driving with regard to his or her blood glucose. Many vehicular accidents and injuries occur each year concerning people with diabetes who have hypoglycemic reactions while driving. One teaching point to reduce these events is to recommend to patients that they check their blood glucose a half hour to 1 hour be-
fore driving and to check again at the time they get behind the wheel. This “vectoring” procedure helps to determine if blood glucose levels are going up, down, or staying constant, therefore alerting the driver to any possible problems that could arise while driving. Checking the blood glucose periodically while driving would provide an extra margin of safety on long trips.

Other Key Points to Emphasize to Your Patients

- Carry a carbohydrate source with you at all times.
- Never be caught without a glucose meter. There are small, simple, and lightweight meters available that can substitute for the standard meter when necessary and will use the same strips.
- Limit alcohol consumption to 1 or 2 drinks per day and with food. Alcohol reduces the ability to maintain or raise the blood sugar in response to decreasing blood glucose.
- Understand to what extent physical activity lowers blood glucose levels and how much less insulin is required during and after increased physical activity. Know your body!
- Performing occasional 2 or 3 a.m. blood glucose checks can help identify nighttime low blood glucose levels as well as the amount that blood glucose levels drop during the middle of the night.
- Continuous glucose monitoring (CGM) can be effective at not only warning patients of low blood glucose but also predicting glucose trends to help avoid hypoglycemia altogether.

Conclusion

Hypoglycemia awareness training can play a key role in improving outcomes and quality of life for people with diabetes. Whether it is working with patients to identify and reestablish the earliest warning signs of low blood glucose or to help them gain the confidence to engage in everyday activities while maintaining safe blood glucose levels, it should become an integral part of every diabetes self-management program.

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REFERENCES


