Leveraging Health Literacy and Patient Preferences to Reduce Hypoglycemic Events in Patients with Type 2 Diabetes

Welcome to the FDA course, "Leveraging Health Literacy and Patient Preferences to Reduce Hypoglycemic Events in Patients with Type 2 Diabetes."

This course is accredited for one hour of continuing education for physicians, pharmacists, and nurses. It should take approximately one hour from start to finish, including all knowledge checks, to complete the program.

Learning Objectives

The learning objectives of this course are to:

Describe the prevalence of hypoglycemic events among patients with type 2 diabetes mellitus and identify risk factors leading to an event;

Introduce methods of assessing health literacy and numeracy of patients and caregivers;

Review effective ways to incorporate patient preferences into care plans and differentiate A1C target values for individuals; and

List the action steps to reduce the likelihood of a hypoglycemic event for a high-risk patient.

What Is Hypoglycemia?

Hypoglycemia, commonly known as low blood sugar, occurs when the level of glucose in the blood drops below normal. For many people with diabetes, hypoglycemia is considered to be a blood glucose level below 70 milligrams per deciliter. Hypoglycemia can be a side effect of insulin use or other hypoglycemic prone anti-hyperglycemic medications. There are many other risk factors that can contribute to hypoglycemia.

Symptoms of Hypoglycemia

Symptoms of hypoglycemia vary from person to person.

Mild symptoms include: shakiness, sweating, fast heartbeat, dizziness, hunger, blurred vision, difficulty concentrating, palpitations, anxiety, headache, and tiredness.

Moderate symptoms include: difficulty moving, confusion, and unusual behavior.

Severe symptoms include: seizures, coma, and combative behavior.

Risk Factors for Hypoglycemia

Common risk factors for hypoglycemia are:

Intensive glucose control or too low A1C targets;

Advanced age and co-morbid conditions including cognitive decline and chronic kidney failure;

Low health literacy and numeracy;

Social determinants including uncertain access to adequate food;

Insulin and sulfonylurea medication therapy;

Low economic status;

Prior hypoglycemic episode;

Hypoglycemia unawareness; and

Liver or kidney disease.

These factors can be inter-related. For example, a prior hypoglycemic event can reduce a patient's hypoglycemic awareness. This coupled with cognitive decline may render someone unable to perceive an event before they fall or lose consciousness.

Hypoglycemia was considered to be a benign and infrequent side effect of treatment in type 2 diabetes. However, more recent data regarding hypoglycemia tells a different story.

Prevalence of Hypoglycemia

In 2015, a population-based meta-analysis estimated that among patients with type 2 diabetes taking insulin:

The prevalence of mild and moderate hypoglycemia was 52%.

The prevalence of severe hypoglycemia was 21%.

The incidence of mild and moderate hypoglycemia was 23 events per person-year.

And the incidence of severe hypoglycemia was one event per person-year.

In 2011, about 282,000 emergency department visits for adults 18 years or older had hypoglycemia as the first-listed diagnosis and diabetes as another diagnosis.

A 2011 study analyzed the frequency and rates of hospitalization after emergency department visits for adverse drug events in older adults. It found that nearly all (specifically, 94%) of hospitalizations attributed to endocrine agents were for hypoglycemia. About two-thirds of these hospitalizations involved loss of consciousness, seizures, change in mental status, or other neurologic issues.

Risk of Hypoglycemia in Older Veterans with Dementia and Cognitive Impairment

In addition, a cross-sectional database analysis of veterans aged 65 years and older, divided according to dementia, cognitive impairment, age, antiglycemic medications, and hemoglobin A1C level showed that:

The frequency of hypoglycemia was more than twice as high in participants with dementia than in those without (14.1% vs. 6.3%)

The frequency was also higher in participants with cognitive impairment (10.4%)

A greater percentage of patients with dementia and cognitive impairment are on insulin, compared to patients with neither condition (30% vs 24%)

Current evidence shows hypoglycemia is considerably prevalent among people with type 2 diabetes, particularly those on insulin. These studies highlight the need for educational interventions and individual therapies to reduce the risk of hypoglycemia.

Knowledge Check

Let's see how much we've learned with a quick Knowledge Check. Select the best answer:

Symptoms of hypoglycemia include:

a) Headache and blurred vision;

b) Seizures;

c) Confusion;

d) All of the above; or

e) None of the above.

The correct answer is "d," all of the above.

Heart Disease Rates in Diabetes Patients

There have been three landmark diabetes randomized controlled trials. These trials compared the rates of heart disease in patients receiving intensive diabetes treatment or conventional diabetes treatment. Intensive treatment lowered the A1C to near-normal average blood glucose levels of 6%; conventional treatment targeted a higher A1C level of 7.5%.

The trials demonstrated that intensive blood glucose lowering to near-normal levels resulted in more hypoglycemia requiring medical assistance.

ACCORD, ADVANCE, and VADT

The Action to Control Cardiovascular Risk in Diabetes (or ACCORD) study was conducted to determine whether intensive glycemic control and bringing an A1C down to less than 6% would reduce the risk for cardiovascular disease in patients with type 2 diabetes, as compared to usual care which is an A1C between 7 and 8%.

The Action in Diabetes and Vascular Disease (or ADVANCE) trial was conducted to find out whether intensifying glucose control to achieve an A1C of 6.5% would provide additional benefit in reducing the risk of both micro- and macro-vascular disease.

The Veterans Affairs Diabetes Trial (or VADT) was a randomized clinical trial of intensive glycemic control in patients with long-standing and relatively advanced diabetes. It was conducted to determine whether intensive glycemic control reduces the risk of macro-vascular complications.

Outpatient Intensive Glucose Control

All three studies showed a large increase in hypoglycemic events in intensively treated patients, compared to patients treated with standard control: 16.2% vs 5.1% in ACCORD; 2.7% vs 1.5% in ADVANCE; and 21.2% vs 9.9% in VADT.

In addition to the higher risk of severe hypoglycemic events, the ACCORD and ADVANCE trials did not show a reduction of cardiovascular events in intensively treated patients.

In the ACCORD trial, when A1C was decreased to less than 6%, a drastic increase in the death rate was observed.

In the VADT, a recent severe hypoglycemic event was shown to be an important predictor for cardiovascular death and death from any cause.

These three studies also found that severe hypoglycemia was strongly associated with increased risks of various adverse clinical outcomes.

Benefits of Intensive Glucose Control

The ADVANCE study lasted five years and the VADT lasted seven and a half years. Contrary to the expectations of the studies, there was no clear benefit on heart disease risk from intensive glucose control for the duration of the study periods.

The rate of heart attacks, stroke, and heart disease was similar between the intensive and standard glucose arms of the studies.

The ACCORD study's intensive glucose control arm was discontinued 18 months early due to a higher number of deaths in the arm compared to the non-intensive arm, 257 versus 203.

So, besides there being no reported cardiovascular benefit, the intensive glucose control actually appeared to be causing harm, in this case, death, in patients.

A1C Variabilities

The trials' results were based on A1C testing. The A1C test reflects average blood glucose levels over the past two to three months. The results of the test vary depending on the laboratory that conducts the test. This means an A1C measured as 7% could indicate a true A1C anywhere in the range from below 6.6% to 7.4%.

This variation demonstrates why strict adherence to an intensive A1C goal may be unsafe for certain patients.

ACCORD Trial – Root Cause of Hypoglycemic Events

Based on the ACCORD trial findings, root causes of hypoglycemic events among patients with type 2 diabetes are:

Use of diabetes medications;

Inadequate Caloric intake and food insecurity;

Exercise;

Errors with use of medications; and

Current illnesses.

Food Insecurity

Food insecurity, or uncertain access to adequate food, is a risk factor of hypoglycemia.

A single-question screening tool had acceptable sensitivity, specificity, and reliability to detect hunger by asking: "In the past month, was there any day when you or anyone in your family went hungry because you did not have enough money for food?"

In 2011, more than 33 million U.S. adults reported that they did not have adequate access to food, a food insecurity rate of 14.5%. That equates to approximately one in seven households in the United States that don't have adequate access to food.

A 2014 study compared hospital admissions attributable to hypoglycemia versus hospital admissions attributable to appendicitis. The risk for hypoglycemia admission increased 27% in the last week of the month vs. the first week of the month in low-income populations. This suggests that the exhaustion of monthly food budgets might be an important driver of health inequities.

Hungry families underuse many types of food assistance programs. Health care providers need to be aware of local assistance programs and refer patients to these resources.

Factors Increasing Hypoglycemic Events—Patient Controlled

Patient controlled factors that increase hypoglycemic events include:

Insufficient carbohydrate intake;

Skipping or delaying meals;

Increasing physical activity;

Drinking too much alcohol without enough food;

Taking medications incorrectly; and

Inadequate nutrition during illness.

Factors Increasing Hypoglycemic Events—Provider Controlled

Health care provider controlled factors also can contribute to an increase in hypoglycemic events. These include:

Lack of shared decision making and individualized A1C target setting;

Aggressive hyperglycemic medication prescribing;

Not addressing patient knowledge gaps; and

Failure to address food insecurity.

Knowledge Check

It's time for another Knowledge Check! Select the best answer: On average, A1C test results can differ by as much as:

a) 10%;

b) 8 to 12%;

c) 2 to 6%;

d) 0.5 to 1%; or

e) None of the above

The correct answer is (c), 2 to 6%.

On average, A1C test results can differ by as much as 2 to 6%, resulting in a real A1C value that is actually lower or higher than the lab result.

What Is Health Literacy?

The most widely accepted definition of health literacy adopted by the National Academy of Medicine is: "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions."

It's important to note that it may not always be obvious if a patient has a low level of health literacy. To be literate in a health care setting requires the ability to read and understand health-related terminology, and to do so during situations that may be emotionally and physically challenging.

Health care encounters often involve complex instructions for taking medications, undergoing medical tests, and dealing with insurance companies, all of which can present a challenge to those with low health literacy.

Health Literacy Issues

According to the U.S. Department of Health and Human Services, 77 million Americans have been identified as having basic or below basic health literacy. This means that they have difficulty with common health tasks such as following directions on a prescription drug label.

Only 12% of Americans were identified as having proficient health literacy, meaning that they are able to use tables to calculate health care costs.

Because of the complex nature of many diabetic treatment regimens, evidence supports an association between limited health literacy and poor outcomes.

Health Literacy Domains

The four primary domains of health literacy identified by the National Academy of Medicine are cultural and conceptual knowledge, speaking and listening skills, writing and reading skills, and numeracy. Achieving optimal outcomes often requires patients to understand written and numerical information, and be able to take appropriate action.

Diabetes-Specific Numeracy

Numeracy is the ability to understand and work with numbers. Interpreting dietary information is a crucial part of diabetes care. It requires numeracy skills such as understanding nutrition labels in order to maintain healthy diabetes diets.

Number skills are necessary to understand the A1C target, blood glucose readings, and carbohydrate calculations. Patients also need to be able to understand the timing and dosing frequency of their medications, and insulin dosing amounts.

Methods of Assessing Health Literacy / Health Numeracy

Assessing a patient's health literacy is important to developing a comprehensive plan of care and providing self-management education. However, because of its complexity, there is currently no single measure that reflects the many constructs related to health literacy; measures are continually being developed and refined.

There is a comprehensive list of instruments that can be used to assess health literacy. Here are four options -- each one has its own benefits:

The Spoken Knowledge in Low Literacy in Diabetes scale;

The Diabetes Knowledge Test;

The Diabetes Numeracy Test; and

The Single-Item Literacy Screener.

Spoken Knowledge in Low Literacy in Diabetes (SKILLD) Scale

The Spoken Knowledge in Low Literacy in Diabetes (or SKILLD) Scale was introduced and validated in 2005, and re-validated in 2012. It was developed by researchers at Vanderbilt University School of Medicine to assess patient knowledge about diabetes self-care issues, including glucose management, recognizing symptoms and the treatment of high and low blood sugar, appropriate lifestyle modifications, and appropriate activities to prevent long-term consequences of uncontrolled diabetes.

Other organizations have developed SKILLD scale versions in languages such as Spanish, Dutch, Turkish, Farsi, and Kiswahili.

The SKILLD scale consists of 10 open-ended questions that determine knowledge patients should have to best manage their diabetes.

Spoken Knowledge in Low Literacy in Diabetes (SKILLD) Scale Sample Questions

Here are a few sample questions and correct responses from the SKILLD scale:

"What are the signs and symptoms of low blood sugar? Name at least two."

If the patient has no answer or does not understand the question, follow-up with:

"How do you feel when your blood sugar is too low?"

The answer must contain any two of the following: hunger, nervousness, mood swings, dizziness, weakness, jitteriness, irritability, confusion, sweatiness, fast heart rate, or light headedness.

"How do you treat low blood sugar?"

If the patient has no answer or does not understand the question, follow-up with:

"What should you do if your blood sugar is too low? How can you bring your blood sugar up if it's too low?"

The answer must be clear about an action: drink juice, eat candy, drink milk, eat sugar or sweets, or have a sugared soft drink.

Diabetes Knowledge Test (DKT2)

The Diabetes Knowledge Test (or DKT2) was originally validated and published in 1998, and revised in 2016. DKT2 is a quick and low-cost method of assessing a patient's or a population's general knowledge of diabetes and diabetes self-care.

The test consists of 23 items. It takes approximately 15 minutes to complete. There are two components of the test, a 14-item general test and a 9-item insulin use subscale.

The DKT2 has been adapted for use in Greece, Ireland, Jamaica, Malaysia, New Zealand, Northern Ireland, Norway, and Singapore and translated by researchers into Spanish, Greek, Navajo, Norwegian, and Bahasa Malaysian.

Diabetes Knowledge Test (DKT2) Sample Questions

Here are a few sample questions and correct responses from the DKT2 test:

"Which of the following is highest in carbohydrate?"

a) Baked chicken;

b) Swiss cheese;

c) Baked potato; or

d) Peanut butter.

The correct answer is "c." The baked potato has the most carbohydrate grams of the listed foods.

"For a person in good control, what effect does exercise have on blood glucose?"

a) Lowers it;

b) Raises it; or

c) Has no effect.

The correct answer is "a." In people with good blood glucose control, exercise will lower the blood glucose.

"What effect will an infection likely have on blood glucose?"

a) Lowers it;

b) Raises it; or

c) Has no effect.

The correct answer is "b." An infection will likely raise the blood glucose.

"If you have taken rapid-acting insulin, you are most likely to have a low blood glucose reaction in:"

a) Less than 2 hours;

b) 3 -5 hours;

c) 6 -12 hours; or

d) More than 13 hours.

The answer is "a." If you have taken rapid-acting insulin, you are more likely to experience a low blood glucose reaction in less than 2 hours.

Diabetes Numeracy Test (DNT)

The Diabetes Numeracy Test or DNT is a valid and reliable assessment of diabetes- specific numeracy. The Diabetes Numeracy Test 15 was designed to retain the items that discriminated diabetes related numeracy skills, while keeping the items that would be most useful to a diabetes educator or clinician. It is a shortened version of the original DNT and touches on five diabetes self-care areas, including:

Three items on nutrition,

One item on exercise,

Three items on blood glucose monitoring,

One item on oral medications, and

Seven items on insulin administration.

Diabetes Numeracy Test (DNT) Sample Questions

The DNT evaluates a variety of quantitative skills using a word-problem based format within the context of common diabetes tasks, such as interpreting results from glucose self-monitoring, evaluating a nutrition food label, and calculating medication requirements.

Here are a few sample questions and correct responses from the DNT test:

"You test your blood sugar three times a day. You purchase a prescription of 50 strips on March 5th. Of the dates below, by when will you need to buy new strips?"

a) March 21st;

b) April 21st;

c) May 21st; or

d) June 21st.

The correct answer is (a), March 21st.

"You are given the following instructions: 'take one unit of insulin for every 7 g of carbohydrate you eat.' How much insulin do you take when you eat 98 g at supper?"

The correct answer is 14 units.

Single-Item Literacy Screener (SILS)

The Single-Item Literacy Screener (or SILS) was designed to quickly identify patients who need help with reading health-related information. The SILS asks only one question: "How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?"

The responses range from 1 (never) to 5 (always). To help address traditional underreporting of difficulties by patients, the authors identified 2 as the cut-off point to capture more patients that may be in need of assistance.

This tool may be useful for those who face time limitations. Although it may not be as comprehensive as the other tools, it may be more feasible to implement during routine care.

Supplementing this tool with open-ended questioning regarding patients' understanding of diabetes, their medications, and how medications are taken may enable clinicians to assess understanding on a more informal basis. The important thing is that some sort of an assessment of health literacy is done rather than just making an assumption.

Adult Carb Quiz

In addition to the four tools previously mentioned for assessing health literacy and numeracy skills, the Adult Carb Quiz is an important and validated method of assessing patients' knowledge of carbohydrate counting.

It is a paper-based quiz that includes true-or-false and multiple choice questions. It consists of 43 items and takes approximately 15 minutes to complete.

It covers the following six domains:

Carbohydrate food recognition;

Carbohydrate food content;

Nutrition label reading;

Glycemic targets;

Hypoglycemia prevention and treatment; and

Calculating carbohydrate composition in a mixed meal.

Adult Carb Quiz Sample Questions

Here are a few sample questions from the Adult Carb Quiz:

"A good blood sugar reading just before a meal would be:"

a) Don't know;

b) 60;

c) 110; or

d) 180.

The correct answer is "c," 110.

"You are going to mow the grass which takes about 30 minutes of solid work. By how many points do you expect your blood sugar to go down?"

a) Don't know;

b) 25;

c) 50; or

d) 150.

The correct answer is "c," 50.

Knowledge Check

Are you ready for another Knowledge Check question?

True or False: "A U.S. Department of Health and Human Services brief said that 77 million Americans were identified as having basic or below basic health literacy."

The correct answer is True.

Knowledge Check

Let's try another question.

True or False: "Evidence supports an association between limited health literacy and poor diabetes outcomes."

The correct answer is True.

Translation into Practice

After assessing a patient's level of health literacy, clinicians should apply the information to appropriately tailor interventions and provide health education.

For a patient who has difficulty understanding numerical information, it may be better to initiate consistent doses, pre-dosed delivery methods, and fewer injections rather than conducting pre-prandial (before a meal) glucose testing and insulin titrations. Although this may not be optimal according to the guidelines, it may increase adherence and be a more effective treatment plan.

Always communicate using clear, simple, jargon-free language. Limit patient discussion, written materials, and spoken educational materials to words that contain no more than two syllables each when possible.

Limit information to no more than three topics. This is another one of the easiest ways to ensure that patients understand the information.

Visual Aids

Patients with limited literacy may benefit from visual aids and written materials. Visual aids help patients understand and recall information; they can even lead to attitude and behavioral changes.

A visual aid can be any graphical representation of a probabilistic concept related to health. They include pie charts, bar graphs, icon arrays, and other kinds of displays. Visual aids can be very helpful for vulnerable populations, such as older adults, high-risk patients, immigrant populations, and those that have poor numeracy skills and little medical knowledge.

Another benefit of visual aids is that patients can refer to the materials after their visit. So when possible, offer the materials to patients.

"Teach Back" or "Show Me" Method

Use a "teach back" or "show me" method to ensure the patient understands what is being discussed and to clarify any miscommunications. For example:

Ask the patient to explain what you discussed in their own words;

Use plain language;

Ask open-ended questions;

Use non-shaming language and tone;

Use comfortable body language and eye contact; and

When needed, re-explain and check again to make sure the patient understands.

Here are some questions that can be asked:

"I want to be sure that I explained your medication correctly. Can you tell me how you are going to take this medicine?"

"We covered a lot today. I want to be sure I explained things clearly. What are three strategies that we discussed that will help you control your diabetes?" and finally,

"What are you going to do when you get home?"

Apply the Ask Me 3

The "Ask Me 3" method is another approach to help ensure a patient understands what was discussed.

Start by encouraging patients to understand the answers to these questions:

What is my main problem?

What do I need to do? and

Why is it important to do this?

Emphasize the desired behavior rather than just the medical facts.

Knowledge Check

Let's see what we've learned with another Knowledge Check.

Which of the following tests or methods have been identified as effective health literacy tools?

(Choose all that apply)

a) SKILLD;

b) DKT2;

c) SILS;

d) TNT; or

e) All of the above.

The correct answer is "a," "b," and "c." SKILLD, DKT2, and SILS.

Knowledge Check

Let's try another one.

True or False: The easiest way to ensure your message complies with universal literacy comprehension is to limit your patient discussion to words that are two syllables or less whenever possible.

The correct answer is True. Limit your patient discussion to words that are two syllables or less whenever possible.

Key Elements of Shared Decision Making (SDM)

The concept of shared decision making outlines how health care providers should incorporate patient preferences into care plans and select target values based on individual circumstances.

The U.S. Department of Veterans Affairs developed a set of guidelines to improve patient outcomes and management of patients with diabetes through the concept of shared decision making. Each element is important to ensure that patients have an active role in their treatment plans. Key elements of shared decision making are:

ASK - A patient-centered approach, with motivational interviewing

PRIOIRITIZE - Help patients focus on their needs

ASSESS - Assess the capacity of the decision-making process and address patient and provider barriers

ADVISE - What is the evidence? Use risk communication

ACKNOWLEDGE - Agree on what's important for the individual; share values, power, expectations

ASSIST - Provide tools to help weigh options; promote input from others

MAKE DECISION - If ready, make the choice

EVALUATE - Evaluate the process; revisit the decision if there are concerns

Shared Decision-Making Algorithm

Shared decision making will not be appropriate in all circumstances. For example, if a patient presents during a hypoglycemic episode, the shared decision-making process listed above would not be appropriate. The patient needs to be treated immediately.

However, if the patient presents for an appointment to adjust their diabetes regimen, these steps can be used to include the patient in the decision-making process so that they can select a regimen that will be feasible for their lifestyle.

Step 1: Assess Health Literacy Status and Assume Some Level of Health Literacy Deficit

The following steps were adapted from the VA's "Guide to Using Shared Decision Making" when treating patients with type 2 diabetes.

Step 1: Assess health literacy status and assume some level of health literacy deficit.

Utilize one or more of the health literacy assessment tools available. Assume some level of health literacy deficit; as discussed only 12% of U.S. adults have proficient health literacy. Adjust your communication style based on the patient's level of health literacy.

Step 2: Identify Critical Factors

Step 2: Identify critical factors such as major comorbidity or physiological age, and the degree of microvascular disease present.

Next, you'll need to identify the following factors of the patient:

Major comorbidity or physiological age; and

Degree of microvascular disease present

You'll need to know both of these before moving on to Step 3.

Step 3: Recommend Target Based on "7-8-9" A1C Goal Ranges

Step 3: Recommend target based on "7-8-9" A1C goal ranges.

After identifying the necessary information in Step 2, you are able to use the table shown here to recommend an A1C goal.

For example, if a patient has no major comorbidities and a life expectancy of more than 10 years with no or mild microvascular complications, the patient's A1C goal could be below 7%. However, if the same patient presents himself but has advanced microvascular complications, the A1C goal should be in the 8-9% range.

Findings from a 20-year study of a randomized control trial of intensive glucose control therapy versus conventional therapy to reduce complications of type 2 diabetes, showed no difference in cardiovascular disease outcomes after the trial. A 10-year follow-up showed a modest reduction in cardiovascular disease. So patients having major comorbidities or advanced age are more likely to suffer complications from hypoglycemia rather than achieve a benefit.

Step 4: Discuss Recommended A1C Target and Ask Patient About Factors Specific to Them

Step 4: Discuss the recommended A1C target and ask patients about factors specific to their circumstances.

Some of these factors may include motivation, adherence, ability to care for themselves, the support system, risk or fear of hypoglycemia, and economic factors.

Discuss the patient's willingness and ability to incorporate a diet and an exercise plan into their routine.

Discuss how and when they are able to take medications. Are they able to self-administer medicines?

Determine who they can call if help is needed.

Talk about any fears or concerns that they may have regarding diabetes or their treatment regimen.

Discuss any financial restraints that may cause problems with food availability.

Step 5: Use Framework and Patient Preferences to Collaborate with Patient / Family for Best Management Option

Step 5: Use framework and patient preferences to collaborate with the patient and their family for the best management option.

Some patients have better outcomes with more intense diabetes treatment, while others have better outcomes with less intensive treatment. When determining the treatment needs of patients, consider age, comorbidities, adherence levels, and self-care capabilities.

The diagram shown here may help you in predicting which patients would have better outcomes with a more intense or less intense diabetes treatment.

Step 6: Agree on Action Plan and Set Goals

Step 6: Agree on an action plan and set goals.

Partner with the patient for safe and effective care. Discuss and decide the treatment strategy the patient has chosen and can adhere to. Patients and caregivers may accept the recommendations or choose a less or more intensive strategy. The objective of shared decision making is to partner with the patient for safe and effective care, always allowing them to change their goals.

Medication Selection

As mentioned, the ACCORD trial found that a root cause of hypoglycemic events among patients with type 2 diabetes is the use of diabetes medications.

Hypoglycemic agents, insulin and sulfonylureas, are the second most common medications (after warfarin) associated with emergency department visits and hospitalizations.

Sulfonylureas such as glyburide, glipizide and chlorpropamide, and meglitinides such as nateglinide and repaglinide increase hypoglycemia risk by stimulating insulin secretion from the pancreas.

Researchers have concluded that the risk of hypoglycemia of each sulfonylurea relates to its pharmacokinetic properties and is highest with long-acting sulfonylureas such as chlorpropamide, glyburide, and long-acting glipizide.

Glyburide is associated with significantly more episodes of severe hypoglycemia because its hypoglycemic effects last for 24 hours, a consequence of the presence of active metabolites.

According to the 2012 Beers Criteria, glyburide is not recommended for use in older adults due to its high risk of severe, prolonged hypoglycemia effect.

Many patients with type 2 diabetes are on a combination of these medications, which may increase the risk of a hypoglycemic event. Always be mindful of this situation.

Medications used for diabetes in the low hypoglycemic risk category include biguanides such as metformin, along with DPP-4 inhibitors, GLP-1 analogs, SGLT-2 inhibitors, alpha-glucosidase inhibitors, and thiazolidinediones.

Medication Management

When discussing medication management:

Advise patients to avoid skipping meals; this reduces the need for medication adjustment and hypoglycemic events.

Inform patients that exercising during the peak effect of a rapid-acting insulin dose increases the risk of severe hypoglycemia. Although the risk of exercise-induced hypoglycemia is lower in patients who use only long-acting insulin, doses likely will need to be reduced for individuals participating in regular physical activity.

Advise patients that they should always carry glucose tablets or gel or hard candy if they are at risk for hypoglycemia.

Teach patients to take medicines correctly. For example, discuss whether they should administer insulin or oral medicines with meals or not.

Knowledge Check

It's time for another Knowledge Check question!

"Which drug class has the LOWEST risk of hypoglycemia?"

a.) Insulin (long-acting);

b.) Sulfonylureas (glyburide);

c.) Meglitinides (repaglinide); or

d.) Biguanides (metformin).

The correct answer is "d." Biguanides, such as metformin, have the lowest risk of hypoglycemia associated with them.

Knowledge Check

Let's try one more:

True or False: "Each step of the shared decision-making process should be used for every patient."

The correct answer is False. Shared decision making will not be appropriate in all circumstances. For example, if a patient presents during a hypoglycemic episode, the shared decision-making process would not be appropriate. In this case, the patient needs to be treated immediately.

Case Study

GT is a 72-year-old man with an A1C of 7.2% and history of cardiovascular disease. He had a myocardial infarction (or MI) two years ago. For his diabetes, he is currently taking metformin 500mg BID, glipizide 5mg BID, and Lantus 20 units at bedtime. He has a fixed income with limited access to food, and his wife recently passed away.

List the action steps to minimize the risk of a hypoglycemic event for this patient.

Action Steps to Minimize Risk for Hypoglycemic Event

The action steps to minimize risk of a hypoglycemic event are:

Determine any health literacy and numeracy gaps, assuming some level of deficit.

Identify critical factors, such as major comorbidity, physiological age, and degree of microvascular disease.

Recommend an A1C target based on "7-8-9" ranges.

Discuss recommended A1C target and ask the patient about factors specific to them. This includes discussing medications and access to food.

Use framework and patient preferences to collaborate with the patient and family.

Agree on an action plan and set goals. Plan for a follow-up, and refer as needed to a dietitian, social worker, clinical pharmacist, primary care provider, RN case manager, or certified diabetes educator.

Action Steps in Action

Here is how the action steps worked for the patient in the Case Study:

Determine any health literacy and numeracy gaps. It was observed that the patient incorrectly measured units of insulin.

Identify critical factors. The patient had a myocardial infarction two years ago, and has cardiovascular disease.

Recommend an A1C target based on "7-8-9" ranges. Due to the patient's age, co-morbid disease states, and the fact that he lives alone and has limited access to food, an A1C target range of 8-9% was set.

Discuss recommended A1C target and ask the patient about factors specific to them. This patient lives alone, is on a fixed income, and has limited access to food. This increases his risk for hypoglycemia and puts him at risk for severe consequences. For example, he could have an episode while alone and be unable to treat himself.

Use framework and patient preferences to collaborate with patient and family. Partnership with the patient occurred throughout the whole process.

Agree on an action plan and set goals. The patient's bedtime Lantus dose was decreased. The patient was given contact information of a local resource to access food, and shown the correct technique to measure insulin. The patient was scheduled to return for a follow-up appointment, and was also referred to a registered dietitian nutritionist for assistance with food insufficiency.

Summary

In summary, hypoglycemia is considerably prevalent among people with type 2 diabetes, particularly those on insulin.

Assume some level of health literacy and numeracy deficit in patients;

Communicate using simple language;

Personalize each A1C target depending on patient risk factors, using shared decision making to enhance safe and effective care; and

Create safe and effective care plans using patient specific social determinants of health to reduce the risk of a hypoglycemic event.

Conclusion

Thank you for completing this presentation on leveraging health literacy and patient preferences to reduce hypoglycemic events in patients with type 2 diabetes.

You should now be able to:

Describe the prevalence of hypoglycemic events among patients with type 2 diabetes mellitus and identify risk factors leading to an event;

Introduce methods of assessing health literacy and numeracy of patients and caregivers;

Review effective ways to incorporate patient preferences into care plans and differentiate A1C target values for individuals; and

List the action steps to reduce the likelihood of a hypoglycemic event for a high-risk patient.

Additional information about this topic and the studies cited are available in the Resources section of this page.

Thank you!