

CONSIDERATIONS:

1. Hypoglycemia associated with diabetes mellitus is seen in patients treated with insulin and insulin secretagogues (medications that work by causing the pancreas to secrete more insulin, such as sulfonylureas).
2. Hypoglycemia is not a disease; it is a condition caused by an underlying problem/disease that prevents the body from maintaining normal blood glucose levels. The ADA Consensus Workgroup defines hypoglycemia by type of event. Hypoglycemic events include:
 - a. Severe hypoglycemia requires the assistance of another person to administer carbohydrate, glucagons, or other resuscitative actions. Due to the mortality associated with this type of event, blood glucose levels may not be available during the event
 - b. Documented symptomatic hypoglycemia occurs when typical hypoglycemic symptoms are accompanied by documented blood glucose of ≤ 70 mg/dl
 - c. Asymptomatic hypoglycemia occurs when the patient does not experience the typical hypoglycemia symptoms but the blood glucose level is documented to be ≤ 70 mg/dl
 - d. Probable symptomatic hypoglycemia occurs in patients who treat symptoms of hypoglycemia without testing blood glucose. It is presumed the symptoms were caused by a blood glucose level ≤ 70 mg/dl
 - e. Relative hypoglycemia occurs when the patient reports any of the typical hypoglycemic symptoms, interpreting them as hypoglycemia, but with a documented blood glucose level > 70 mg/dl. This is seen in patients with chronically poor glycemic control
3. Correlation between hypoglycemia symptoms and blood glucose levels vary among individuals with diabetes. However, because lower glucose levels impair defenses against subsequent hypoglycemia, glucose levels lower than 70 mg/dL are defined as hypoglycemia. Hypoglycemia episodes vary greatly in severity. But hypoglycemia severity is defined by symptoms, not blood glucose values:
 - a. Mild hypoglycemia or autonomic nervous system symptoms include: sweating, trembling, tachycardia, dizziness, difficulty concentrating, lightheadedness and poor coordination
 - b. Severe hypoglycemia or neuroglycopenia symptoms include: mental confusion, lethargy, inability to self-treat, seizures and loss of consciousness
 - c. Hypoglycemic unawareness occurs when a person does not feel or recognize the symptoms of hypoglycemia. It occurs in patients who:
 - i. Have long standing diabetes
 - ii. Are using an intensive insulin management approach
 - iii. Are pregnant
 - iv. Have autonomic neuropathy
 - v. Use beta-blockers and have comorbiditiesThese patients may need to be on a regular monitoring schedule, e.g., every 3 or 4 hours
4. Symptoms of hypoglycemia include:
 - a. Mild:
 - i. Sweating
 - ii. Tachycardia
 - iii. Tremors, poor coordination
 - iv. Dizziness, lightheadedness
 - v. Difficulty concentrating, feeling of anxiety
 - b. Severe:
 - i. Confusion, inability to treat self
 - ii. Seizures, loss of consciousness
5. Treat hypoglycemic patients with 15 grams of fast-acting sugar or carbohydrate if blood glucose level is:
 - a. 70 mg/dL or less
 - b. Between 70 – 100 mg/dL and the patient is experiencing symptoms of hypoglycemia
6. Sources of 15 grams of fast acting carbohydrate include:
 - a. Unsweetened fruit juice, 4 oz. (Use apple juice for patients with impaired renal function.)
 - b. Regular soda, 4 oz. (not diet soda)
 - c. Sugar water, 4 teaspoons sugar in 4 oz. water
 - d. Glucose tablets, 4 tablets
 - e. Milk, 8 oz. (preferably non-fat or low fat)
7. Symptoms of hypoglycemia in insulin-treated or oral insulin secretagogues patients can occur precipitously. Causes include:
 - a. Medication error
 - b. Omitting meal
 - c. Increase in activityPatient should be coached to have ready source of carbohydrate available at all times.
8. Patients taking insulin or oral insulin secretagogues to treat diabetes should be instructed in
 - a. Prevention of hypoglycemia
 - b. Recognizing signs/symptoms of hypoglycemia
 - c. Treatment of hypoglycemia

EQUIPMENT:

Blood glucose testing equipment (See *Endocrine System - Blood Glucose Testing*)

PROCEDURE:

1. If patient is unconscious or having seizures:
 - a. Call 911 (emergency transport system)

- b. Administer Glucagon if prescribed/available
(See *Endocrine System - Glucagon Administration*.)
 - c. Obtain blood glucose
 2. If patient has signs or symptoms of hypoglycemia, perform a capillary blood glucose test. (See *Blood Glucose Testing*.)
 3. If blood glucose is either below 70 mg/dL or between 70 – 100 with hypoglycemic symptoms:
 - a. Give one of these 15- gram fast-acting carbohydrate items:
 - i. 4 oz of unsweetened fruit juice
 - ii. 4 oz of regular soda
 - iii. 8 oz of Milk (nonfat/low-fat preferred)
 - iv. 4 teaspoons sugar in 4 oz. water
 - v. 4 glucose tablets
 - b. Retest capillary blood glucose in 15 minutes to determine appropriate rise in blood glucose
 4. If blood glucose shows continued hypoglycemia after 15 minutes (< 70 mg/dL):
 - a. Repeat 15 grams of rapidly absorbing sugars or carbohydrates
 - b. Continue repeating capillary blood glucose testing every 15 minutes until the blood sugar returns to normal 70 mg/dl or higher
 - c. If repeated attempts do not raise blood sugar above 70, call health care provider or 911
 5. Once blood glucose returns to normal:
 - a. Instruct the patient to eat a snack or next meal, which includes protein and complex carbohydrates
 - b. Monitor blood glucose again in about 60 minutes to see if additional treatment is necessary
 - c. If patients are elderly, monitor closely for another hypoglycemic event over next 24 hours
 - d. Explore with patient/caregiver possible causes of the event. Assess the patient's/caregiver's diabetes management of:
 - i. Blood glucose testing and recording log
 - ii. Activity/exercise, including increases and decreases
 - iii. Diabetes medication management, with attention to extra or over-dosing
 - iv. Meal planning and carbohydrate counting, with attention to omitting, decreasing, or restricting carbohydrates
 - e. Assess blood glucose pattern/ trends signaling hypoglycemia and possible unawareness
- d. Causes identified leading to hypoglycemia
 - e. Confidence and commitment of patient/caregiver to regain glucose control
 - f. Instructions given to patient/caregiver
 - g. Communication and orders from physician
 2. Instruct patient/caregiver on:
 - a. Signs, symptoms, treatment and prevention of hypoglycemia
 - b. Change in care if ordered by the physician
 3. Communicate with physician about:
 - a. Severe hypoglycemic events (each and every time they occur)
 - b. Three or more hypoglycemic events in a week

REFERENCE:

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- American Diabetes Association (2012). *Standards of Medical Care in Diabetes—2012*. Diabetes Care. Retrieved May 17, 2012 from http://care.diabetesjournals.org/content/35/Supplement_1/S11.full
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- Childs, B.P., Grother, J.M., & Greenleak, P.J. (2012). *Strategies to Limit the Effect of Hypoglycemia on Diabetes Control: Identifying and Reducing the Risks*. Retrieved May 18, 2012 from <http://clinical.diabetesjournals.org/content/30/1/28.full>
- National Diabetes Information Clearing House (NDIC). *Hypoglycemia*. Retrieved May 18, 2012 from <http://diabetes.niddk.nih.gov/dm/pubs/hypoglycemia/#treatment>
- U.S. National Library of Medicine. *Diabetes Low Blood Sugar - Self-care*. Retrieved May 18, 2012 from <http://www.nlm.nih.gov/medlineplus/ency/patientinstructions/000085.htm>

AFTER CARE:

1. Document in patient's record:
 - a. Signs or symptoms of hypoglycemia
 - b. Blood glucose test results
 - c. Treatment given and patient's response to the treatment

White, J.R. (2007). *The Contribution of Medications to Hypoglycemia Unawareness*. Retrieved May 18, 2012 from <http://spectrum.diabetesjournals.org/content/20/2/77.full>

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