American Red Cross

Scientific Advisory Council

ARC SAC Advisory
Oral Glucose for Diabetic Emergencies

Overall Recommendation:

The available scientific evidence supports the position that assisting in the administration of oral glucose to a diabetic patient who is experiencing signs and symptoms of hypoglycemia plays a key role in preventing progression to severe hypoglycemia and in reducing morbidity.

Recommendations and Strength (using table below):

Standards: none

Guidelines:

1. The lay rescuer may give oral (swallowed) glucose or sucrose to a patient when:
    a. the patient is identified as a diabetic, and
    b. the patient says he or she needs some sugar or states that he or she is having a hypoglycemic reaction, and
    c. the patient is awake and able to swallow.
2. The recommended amount of glucose or sucrose to ingest is 15 grams for children, 20 grams for adults, to be repeated if symptoms persist after 15 minutes.
3. Oral glucose tablets, 15 - 20 gm, are the preferred oral agents, and are commonly available in 4 gm tablets. Sucrose-containing candies in an amount equivalent to ~15 grams are also effective in resolving hypoglycemia in children and adolescents.

Options:

Less effective methods (in priority of effectiveness) include dissolved (liquid) glucose, glucose gel, orange juice 12 oz, sugar cubes/granular table sugar. Buccal absorption of glucose is limited and is not recommended.

Questions to be addressed:

Should lay rescuers be taught how and when to assist patients with administering glucose (sugar) during a diabetic emergency (hypoglycemia)?

Additional questions addressed with this review:

What is the incidence of hypoglycemia in diabetics?
What is the mortality/morbidity associated with hypoglycemia?
What are the risks of treatment of hypoglycemia using oral agents?
What is the optimal method/amount for administration of oral glucose to an adult or pediatric diabetic experiencing signs or symptoms of hypoglycemia?

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Introduction/Overview:

Since the last Scientific Review in 2006, there have been several studies performed comparing various forms of oral (swallowed) sugar administered to pediatric and adolescent patients with Type 1 (insulin-requiring) diabetics presenting with hypoglycemia. These studies have also examined the time needed for return of blood sugar levels to normal, the peak blood sugar level reached, the need for repeat dosing of sugar, and patient preference for type of sugar used to treat their hypoglycemia. Previous ARC Scientific Reviews do not address the pediatric patient or which form of sugar is best. In addition, diabetes management has evolved over the past decade and physicians now strive for tighter control of blood sugar in diabetics, which has been demonstrated to lead to more frequent episodes of hypoglycemia. On the other hand, it is recognized that over-treatment of hypoglycemia can lead to rebound hyperglycemia, contributing to poor control of blood sugars.

Summary of Scientific Foundation:

The frequency of hypoglycemia in diabetics varies depending of the severity of hypoglycemia and the type of diabetes, but as a rule of thumb, patients with Type I (insulin-requiring) diabetes experience an average of one episode per week. Intensively treated Type Diabetics may experience up to 10 episodes of symptomatic hypoglycemia per week. Mild, self-treatable hypoglycemia is relatively common in Type 2 (adult-onset) diabetics, but severe hypoglycemia (requiring assistance) is rare and typically occurs in those Type 2 diabetics using insulin.

While few people die from hypoglycemia, it has been shown that acute and repetitive episodes of hypoglycemia can lead to anxiety and fear of public episodes of hypoglycemia, hospitalizations and excessive lowering of daily insulin dose with subsequent worsening of blood sugar control. Other effects from hypoglycemia include chronic mild brain dysfunction, including speech and memory difficulties. Diabetes treatment guidelines recommend that adults and children with diabetes try to prevent hypoglycemia and carry a rapidly acting glucose to use in the event of hypoglycemia.

Mild and moderate hypoglycemia can usually be self-managed by ingesting sugar. Treatment of severe hypoglycemia requires assistance, as the patient may be confused and unable to locate a form of sugar for treatment. Diabetics with severe hypoglycemia can usually swallow various forms of liquid or solid sugar unless there is impaired consciousness (i.e., the patient has passed out or is unable to respond) or seizures. In that case, severe hypoglycemia must be treated by other methods such as intravenous dextrose or injected glucagon via Advance Life Support personnel or family members trained in use of glucagon.

Several studies have compared various forms of ingested sugar and in varying amounts to determine what forms work best to normalize blood glucose levels without causing rebound hyperglycemia or necessitating a second dose of sugar. These studies have led to the development of guidelines and recommendations for treatment of hypoglycemia. For adults, 15 to 20 grams of sugars or carbohydrates are needed to raise blood glucose levels in diabetics with hypoglycemia. Glucose tablets are the preferred treatment for hypoglycemia where the patient is

awake, able to respond and swallow. Many diabetics carry glucose tablets with them and they are commercially available in 4 gram tablets, so 4 or 5 tablets should suffice. Less effective but acceptable forms of sugar include dissolved (liquid) glucose, glucose gel (swallowed), orange juice 12 oz, sugar cubes/granular table sugar (4 teaspoons), and honey (4 teaspoons). There is evidence that foods or liquids high in fructose (such as fruit juice or dried fruit) or containing gelatin or fat may not be as effective in raising blood sugar levels as glucose or sucrose. Buccal absorption of glucose – that is, glucose placed inside the cheek or under the tongue and not swallowed - is limited and not recommended.

For children, 15 grams of sugar is also recommended. Again, glucose tablets are the preferred treatment, but recent studies show that 15 grams of sucrose-containing candies are an effective treatment in addition to the alternatives listed above.

There is a 10 – 15 minute delay between ingesting sugar for hypoglycemia and return of blood glucose levels and improvement of symptoms. If symptoms persist 15 minutes following ingestion of sugar for hypoglycemia, the dose of sugar may be repeated.

As for all medical emergencies, Emergency Medical Services should be called for patients with severe hypoglycemia.