

**FAST FACTS AND CONCEPTS #291**  
**HYPOGLYCEMIA MANAGEMENT IN NON-DIABETIC ADULTS AT THE END OF LIFE**  
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**Background:** The focus of this *Fast Fact* is the assessment and management of non-diabetic patients presenting with symptomatic hypoglycemia at the end of life. Please see Fast Fact #258 for guidance on Diabetes Management at the End of Life.

**Pathophysiology:** Hypoglycemia is confirmed by Whipple's triad: symptoms suggestive of hypoglycemia, a low plasma glucose concentration at the time of symptoms, and resolution of the symptoms after the plasma glucose level is raised (1). When blood glucose levels fall below 70 mg/dl, most patients begin to exhibit both sympathetic-derived symptoms (tachycardia, palpitations, diaphoresis, and tremulousness) and parasympathetic-derived symptoms (nausea and hunger). Neuro-glycopenia can appear at blood glucose levels of 50 mg/dl and include irritability, confusion, blurred vision, tiredness, difficulty speaking, and headaches. The most severe complications include seizure, coma, and death and can occur at blood glucose levels of <40 mg/dl (2). Hypoglycemia may be seen at the end of life from decreased gluconeogenesis from liver failure or from a paraneoplastic syndrome associated with tumors that secrete insulin-like growth factors (3). Patients with sepsis, malignancy, recent sulfonylurea or tramadol exposure, female gender, and renal failure are also at risk (4).

**Prognostic Significance:** An occurrence of hypoglycemia is associated with increased in-hospital and pre-hospital mortality (5). A retrospective analysis conducted in Japanese emergency departments suggested that the 90 day mortality from severe hypoglycemia in non-diabetic patients may be >20% (6).

**Barriers to Recognizing Hypoglycemia at the End of Life:** Hypoglycemia may go unrecognized in the elderly because of restricted communication, cognitive impairment, misattribution of altered mental status to delirium, and a less robust adrenergic response (7). Thus, for the elderly and other at-risk patients with a recent history of hypoglycemia, routine finger stick glucose testing may be appropriate even in end of life care to minimize these barriers and prevent uncomfortable symptoms of hypoglycemia, especially if the patient is in a care setting which would easily allow testing and death is not imminent. Regardless, it is imperative that clinicians caring for terminally ill patients be aware of the signs of hypoglycemia in the absence of diagnostic testing so that appropriate care discussions and clinical decision-making occur between clinicians and the patient's surrogate.

**Corrective Management Options:** At the end of life, clinical responses to hypoglycemia should strive to be convenient, non-invasive, non-disruptive, and consistent with goals of care. In the acute setting, boluses of D50W by intravenous administration, oral glucose tablets/paste or glucagon by intramuscular or subcutaneous route (often provided as an emergency kit) may be given. D50W works almost immediately and contains 25g of dextrose in only 50mL of fluid; however, it requires intravenous access which is not always practical. Glucagon works within 5 minutes; however, it is more costly and the patient must have adequate liver glycogen stores to be effective. Oral glucose may take up to 30 minutes to work (3). During the syndrome of imminent death, return to consciousness may not always be desired especially in patients with concomitant refractory symptoms. In these cases, supportive care that addresses the symptoms of hypoglycemia without correcting the hypoglycemia may be preferred.

**Supportive Care:** The use of benzodiazepines either intravenously or subcutaneously, may be effective in managing the associated anxiety from hypoglycemia. In terminally ill patients with longer life expectancies and more chronic episodes of hypoglycemia, use of continuous dextrose infusions can be utilized to prolong life. Other more novel agents described in the medical literature include human growth hormone (HGH), corticosteroids, diazoxide, nifedipine, or octreotide (3,8,9). Octreotide is known to lead to paradoxical hypoglycemia in some patients; hence a test dose is recommended (3).

**Summary** Hypoglycemia can be both an uncomfortable symptom and a life limiting condition. In patients with altered mental status who have a fair to good functional capacity, this could significantly detract from their ability to enjoy life. There are a variety of treatment options, including corrective action

and management of the side effects of the adrenergic discharge that should be considered, as long as they are consistent with the patient's goals of care and comfort.

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