

**Guidelines
For The Management Of**

Hypoglycemia

By

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**F.I.C.M.S
Clinical Standards
& Guidelines**

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2009 AD

2709 K

**Kurdistan Higher Council
For Medical Specialties**

Bordi Kurdistan Bo Psporayati Pziski

Setting Clinical and Professional Excellence

Hypoglycemia

Defined as blood glucose < 55 mg /dL (3.0 mmol/L), however, hypoglycemic symptoms can occur at a higher blood glucose level in those with chronic diabetes.

Patients with poorly-controlled diabetes experience hypoglycemic symptoms at a higher sugar level than in those with well-controlled diabetes

Autonomic neuropathy in longstanding diabetes may impair adrenergic and glucagonergic response

Diagnosis rests on three criteria (Whipple's triad)

- = Plasma hypoglycemia
- = Symptoms attributable to a low blood sugar level
- = Resolution of symptoms with correction of the hypoglycemia.

Risk factors

- = Strict glycemic control
- = Impaired awareness of hypoglycemia
- = Increasing duration of diabetes
- = Hepatic and renal disease
- = Common during sleep ; nocturnal hypoglycemia.

Aim

keep serum level at 90-180 mg/dL (5-10 mmol/L) until either consciousness restored or permanent brain damage diagnosed

Presentation

Combination of sympathomimetic and neurological clinical features

Symptoms of sympathetic drive:

- sweating
- Anxiety
- Tremulousness (unsteadiness)
- Nausea
- Tachycardia
- Pallor

Symptoms of neuroglycopenia:

- Fatigue and drowsiness
- Aggression
- Nightmares
- Visual disturbances
- Speech impairment
- Poor concentration
- Abnormal behavior
- Confusion
- Loss of consciousness and seizures

= Symptoms vary between patients but individuals tend to show the same manifestations with each episode

= Symptoms may suggest hypoglycemia but diagnosis depends on demonstration of hypoglycemia and resolution by administration of glucose

ASK, time of day, time since last meal, previous episodes, nutritional status, physical and mental development, drugs, (especially insulin or other diabetes drugs) toxins & alcohol, diseases of other organ systems, family history, and response to treatment.

Critical sample of blood obtained at the time of hypoglycemia, before it is reversed. But never withhold therapy pending confirmation of bedside or laboratory testing.

Laboratory Findings

Serum glucose (should immediately be measured) or finger-stick

Complete blood count (CBC)

Blood urea & creatinine, electrolytes, Liver function tests

Urinalysis for ketones

In selected cases

Thyroid stimulating hormone (TSH), ACTH, Cortisol

Alcohol level and Drug screen

Blood cultures

Insulin & C-peptide

Imaging studies

CT scan of head, MRI of the abdomen may be indicated for insulinoma

Management

If the patient is conscious & able to swallow

3-4 ounces (100-120 ml) of fruit juice, 4-5 cubes of sugar or 1 table spoon of honey.

Don't use chocolate or biscuits with high fat concentration as fat delays carbohydrates absorption.

If no response occurs, then repeat the same after 5 minutes. If he feels better then feed meal with complex carbohydrates, like 1 slice of toast or 3 pieces of biscuits to keep normal glucose level till the next meal.

If the patient is unconscious or unable to swallow

Intravenous (IV) glucose bolus:

- 25mL glucose 50%; or
- 50mL glucose 20%; or
- 100mL glucose 10% preferred as less irritant

Give IV of 2-5 ml/kg of 10% Dextrose (rate: 2-3ml/min) as a maintenance till B.sugar >90 mg/dL & the patient is fully alert.

Children: 2-5 mL/kg of glucose intravenous infusion 10% (200-500 mg/kg of glucose)

• Glucagon

Glucagon should not be used at concentrations greater than 1 mg/mL (1 unit/mL)

< 25 kg or < 8 y gives ½ vial (0.5 mg)

> 25 kg or > 8 give full vial (1 mg)

1mg (IV, intramuscular or subcutaneous)

takes 5-10 minutes to work, as it has short duration of action (15-20 minutes) we cover with I.V. hypertonic glucose

As it relies on glycogen stores therefore it may not be effective in :

- cachectic patients
- alcoholic, liver disease
- young children
- hypoglycemia due to fatty acid oxidation or glycogen storage disorders
- chronic hypoglycemia

It is contraindicated in insulinoma and pheochromocytoma.

Checking random blood glucose level

- After 30 min initially and then every 60 minutes and the dextrose infusion adjusted accordingly until B. sugar > 90 mg/dL in two consecutive hours.
- Then check B. sugar every two to four hours.
- All patients with hypoglycemia of unknown cause require admission.
- Patients with **oral hypoglycemic overdose** differ from insulin overdose hypoglycemia, in that admission should be for at least 72 hrs due to the prolonged effect of these oral agents, the admission might be extended further to 3 – 5 days if the condition is associated with renal or hepatic disease

Consider empirical steroids with the advice of senior doctor

- IV bolus of hydrocortisone 1-2mg/kg every 6 hours
- consider adrenal insufficiency

Prolonged hypoglycaemic coma

- A profound hypoglycemia lasting more than 5 hours, usually caused by cerebral oedema
- Use IV mannitol &/or dexamethasone with constant glucose monitoring and IV glucose to keep serum level at 90-180 mg/dL (5-10 mmol/L) until either consciousness restored or permanent brain damage diagnosed.
- Consult senior doctor for further assessment

Criteria for discharge

- Returned to baseline level of functioning
- No evidence of concurrent illness
- B.sugar > 70 mg/dL (4 mmol/L)

Patient education and counseling

Discuss with the patient.

- Any modification in medications to reduce the risk of further hypoglycemia
- How to recognize the symptoms of hypoglycemia
- The role of alcohol in increasing the risk of hypoglycemia
- The effect of exercise on blood glucose levels and glucose and insulin intake in relation to this
- The effect of illness on blood glucose levels
- The importance of regular meals

If the patient is not diabetic & hypoglycemic agents overdose are excluded, consider:

1- Octreotide (Sandostatin)

Effective for suppressing endogenous insulin secretion

Appears to be a safe and effective treatment where glucose therapy is escalating in sulphonylurea overdose

Bolus doses of 1-2 mcg/kg can be given SC every 6-8hrs or an infusion of 30 ng/kg/min

2- Diazoxide (Hyperstat)

Improve symptoms of hypoglycemia caused by increased insulin secretion in patients awaiting surgery or those with nonresectable disease.

Increases blood glucose by inhibiting pancreatic insulin release and, possibly, through an extrapancreatic effect.

With normal renal function, hyperglycemic effects start within 1 h and last a maximum of 8 h.
Adult IV: 100-200 mg bid/tid; refractory hypoglycemia may require higher dosages
PO: Usually 300-400 mg/d; may be as high as 800 mg
Pediatric (Infants and newborns): 8-15 mg/kg/d IV q8-12h

Causes

- Insulin-induced hypoglycemia
 - Excessive doses of insulin therapy
 - Insulin-secreting pancreatic tumor (insulinoma)
 - Alimentary (rapid jejunal emptying with exaggerated insulin response) after gastrectomy, dumping syndrome , bowel bypass surgery or resection
 - Reactive hypoglycemia and idiopathic postprandial syndrome
- Drugs :oral hypoglycemic, beta blockers, sulfamethoxazole and trimethoprim (Bactrim)
- Hypopituitarism & adrenal insufficiency,
- Hepatic, renal failure & alcohol intoxication
- Tumors like carcinoma of the cervix, hepatoma, mesothelioma, and fibrosarcoma
- Inborn error of metabolism e.g. glycogen storage diseases.

The blood glucose values may be spuriously low in polycythemia rubra vera because of the unequal distribution of glucose between erythrocytes and plasma, excessive glycolysis by erythrocytes, or both.

Low blood glucose values in leukemia are due to excessive glycolysis by leukocytes and in hemolytic crisis from excessive glycolysis by nucleated erythrocytes. In the polycythemic patient or in serum of the leukemic or hemolytic patient, prompt measurement of glucose in plasma to which an antiglycolytic agent has been added should provide accurate results.

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