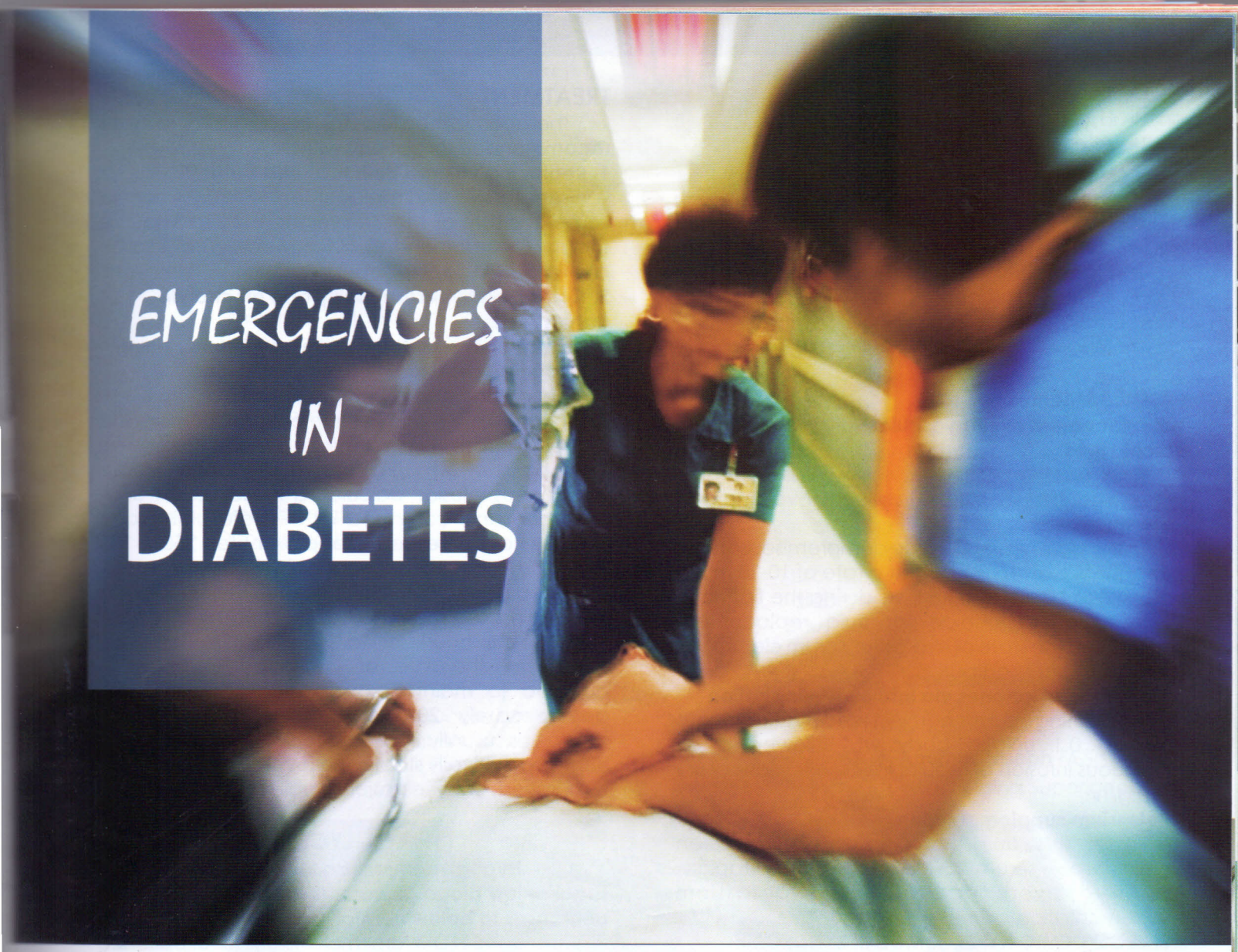
# EMERGENCIES IN DIABETES



Identification and management of emergencies in diabetes is important to prevent mortality. Three most common and immediately life-threatening complications of diabetes are

1) **Diabetic ketoacidosis**
2) **Hyperosmolar hyperglycemic state**
3) **Hypoglycemia.**

## DIABETIC KETOACIDOSIS

Diabetic Ketoacidosis is an acute potentially life-threatening complication in an insulin-dependent diabetic (Type 1) and in some type II diabetes.

Diabetic Ketoacidosis a syndrome in which paucity of insulin and an excess of glucagon combine to produce a deranged metabolic state characterized by hyperglycemia, metabolic acidosis, dehydration and an increased ketone concentration. Most commonly DKA results from patient noncompliance with insulin regimens.

### PRECIPITATING CAUSES

- Infections
- Intercurrent illnesses
- Psychological stress
- Trauma

### CLINICAL FINDINGS

- Polyuria
- Polydypsia
- Weight loss
- Vomiting
- Abdominal pain
- Dehydration
- Weakness
- Mental status change
- Coma

### PHYSICAL FINDINGS

- Poor skin turgor
- Kussmaul respirations

- Tachycardia
- Hypotension
- Alteration in mental status
- Shock
- Coma
- Emesis (coffee-ground in appearance).

## DIAGNOSTIC CRITERIA

- Blood glucose (greater than 250 mg/Dl)
- Serum bicarbonate (lower than 15 mEq/L)
- Arterial pH lower than 7.3
- Moderate degree of ketonemia.

## TREATMENT

**1. Replacement of intravascular volume with isotonic fluid**

Initial fluid therapy is directed towards expansion of the intravascular and extravascular volume and restoration of renal perfusion.

In the absence of cardiac compromise, isotonic saline (0.9% NaCl) is infused at a rate of 10-20 ml/kg body weight/hour or 1-1.5 liters during the first hour. The subsequent choice for fluid replacement depends on the state of hydration, serum electrolyte levels, and urinary output.

**2. Cessation of ketones via insulin administration**

Short acting insulin is administered by intravenous bolus at 0.1 unit/kg body wt, followed by a continuous infusion of regular insulin at a dose of 0.1 unit/kg/hr.

**3.Potassium supplementation**

Once (IV) fluids and insulin have been administered, serum K+ levels fall very rapidly. Therefore every patient needs potassium supplementation

### HYPERGLYCEMIC HYPEROSMOLAR SYNDROME

Hyperglycemic hyperosmolar syndrome (HHS) is a serious complication of diabetes and has a high mortality rate. It occurs most commonly in older patients with type II diabetes.

### PRECIPITATING CAUSES

- Pneumonia
- Urinary tract infection
- Acute coronary syndromes
- Trauma
- Surgery
- Cerebrovascular accidents

### SIGNS ANS SYMPTOMS

- Hypotension
- Tachycardia
- Altered mental status.

### DIAGNOSTIC CRITERIA

- Plasma glucose concentration greater than
- 1000 mg/dL
  Serum osmolality greater than 350
- mOsm/kg
- Absence of ketoacidosis

## TREATMENT

Therapeutic measures for HHS are similar to those recommended for patients with DKA

**1. Replacing volume deficit**

Aggressive fluid replacement with 0.9% normal saline at a rate of 1 to 2 L over the first 2 to 3 hours is the usual recommendation, followed by 0.45% saline at a rate of 200 to 500 mL per hour.

**2. Correcting hyperosmolality and electrolyte disturbances,**

**3. Managing the underlying illness that may have precipitated metabolic decompensation.**

**4. Rehydration and volume expansion**

Rehydration and volume expansion lower the plasma glucose initially, Insulin is administered by an initial bolus of 0.1 U/kg followed by a continuous intravenous infusion calculated to deliver 0.1 U/kg per hour, and continued at this rate until blood glucose has decreased to approximately 250 to 300 mg/dL. At this time, intravenous fluids should be changed to dextrose -containing solutions (5%) and the insulin dose should be decreased by 50% (0.05 units/kg per hour), or to 2 to 3 units per hour. Thereafter, the rate of insulin administration is adjusted to maintain a blood glucose level of approximately 200 mg/dL. Intravenous insulin infusion is usually continued until the patient is hemodynamically stable, the level of consciousness is improved, and the patient is able to tolerate food.

## HYPOGLYCEMIA

**Hypoglycemia, also known as low blood sugar or low blood glucose, is when blood sugar decreases to below normal**

Patients with T1DM are more likely to experience hypoglycemic events than are those with T2DM.

## CAUSES

- Too much insulin or oral hypoglycemic agents
- Too little food
- Excessive physical activity.
- Insulinoma
- Critical organ failure
- Sepsis and inanition
- Hormone deficiencies
- Inherited metabolic disorders

### SYMPTOMS

Hypoglycemic symptoms can occur suddenly and unexpectedly

**In mild hypoglycemia**

- Sweating
- Tremor
- Tachycardia
- Palpitation

- Nervousness
- Hunger

### In moderate hypoglycemia

- Inability to concentrate
- Headache
- Lightheadedness
- Confusion
- Memory lapses
- Numbness of the lips and tongue
- Slurred speech
- Impaired coordination
- Emotional changes
- Irrational or combative behavior
- Double vision
- Drowsiness

### In severe hypoglycemia

- Disoriented behavior
- Seizures
- Difficulty arousing from sleep
- Loss of consciousness

## TREATMENT

- Oral treatment with glucose tablets or glucose-containing fluids, candy, or food is appropriate if the patient is able and willing to take these

If the patient is unconscious or unwilling to take carbohydrates orally, parenteral therapy is necessary. Intravenous glucose (25g) should be given and followed by a glucose infusion guided by serial plasma glucose measurements.

Hypoglycemia is prevented by a consistent pattern of eating, administering insulin, and exercising.

Routine blood glucose tests are performed so that changing insulin requirements may be anticipated and the dosage adjusted.

Because unexpected hypoglycemia may occur, all patients treated with insulin should wear an identification bracelet or tag stating that they have diabetes. Patients and family members must be instructed about the symptoms of hypoglycemia.

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