

# **NPO/ Total Parenteral Nutrition: Diabetic Ketoacidosis**

## **1. Purpose**

### a. Nutrition Indicators

- Nutritional indicators for hospitalized patients with type I or type 2 diabetes are the same as for other hospitalized patients without diabetes. Hospitalized children, adolescents, metabolically stressed patients, and geriatric patients require assessment by a registered dietitian to determine appropriate meal plan requirements for energy and nutrient intake.

### b. Criteria to Assign the Diet

- Criteria for assigning a “no food by mouth”, NPO, diet is based on the diagnosis that the patient currently has inadequate oral intake due to her current state of consciousness.

### c. Rationale for Diet

- Total parenteral nutrition, TPN, is administered to patients diagnosed with “altered gastrointestinal function”. TPN is prescribed when there are changes in digestion, absorption, or elimination.

## **2. Population**

### a. Overview

- Type I diabetes accounts for 5 to 10 percent of all diagnosed cases of diabetes. Persons with type I diabetes are dependent on exogenous insulin to prevent ketoacidosis and death. Diabetic ketoacidosis is caused by insufficient insulin being available and occurs most frequently in individuals with type I diabetes. It is often what precipitates the diagnosis of diabetes. Ketoacidosis is associated with glycosuria, leading to osmotic diuresis, with loss of water, sodium, potassium, and other electrolytes.
- When blood sugar levels get dangerously low the patient will most likely be having seizures and will most likely become unconscious. This means that the patient will appear to be sleeping but cannot be woken. Fluid replacement may cause fluid buildup in the body, and may cause breathing difficulties. When diabetic ketoacidosis, DKA, is left untreated, the patient is at severe risk for dehydration. The loss of body salts may cause life-threatening abnormal heartbeats. Blood flow to the organs may be decreased and cause organs, such as the kidneys, to fail. Decreased blood flow to the brain may lead to swelling, seizure, death, and in this case coma.
- Total parenteral nutrition, TPN, refers to the use of intravenous catheters to infuse nutritive solutions into the vascular system. TPN completely bypasses the normal processes of ingestion, digestion, and absorption of nutrients when foods are consumed by mouth.

### b. Disease Process

- Type I diabetes is characterized by the abrupt onset of clinical signs and symptoms such as substantial weight loss, polyuria, and polydipsia associated with marked hyperglycemia. If this hyperglycemia is left untreated the patient can develop diabetic ketoacidosis.

c. Biochemical and Nutrient Needs

- In patients with type I diabetes, discontinuation of or inadequate insulin doses lead to the development of diabetic ketoacidosis. Although small amounts of insulin may be circulating, the presence of large amounts of counterregulatory or stress hormones cause the insulin to be less effective.

### 3. General Guidelines

a. Nutrition Rx

- She was also given insulin to reverse the ketoacidosis and was monitored carefully for any complications.
- Crystalline amino acids (CAA) provide the protein source in PN formulations.
- She was given central venous access parenteral nutrition using cyclic TPN given for 18 hours during the night and then fasting for 6 during the day.
- Dextrose per day= patient weight (kg) x (desired GIR) x 1440 min (minutes per day) /1000  
$$\text{g dex/day} = ((56.8 \text{ kg}) \times (4.5 \text{ mg/kg/min}) \times (1440 \text{ mins})) / 1000$$
$$\text{g dex/day} = 368 \text{ g dextrose/ day}$$

Three-in-One PN Formula

Dextrose: 368 g/day

Amino Acids= 100 g/day

Fat= 45 g/day

$368 \text{ g} \times 3.4 \text{ kcal/g} = 1251 \text{ kcal from dextrose}$

$100 \text{ g} \times 4 \text{ kcal/g} = 400 \text{ kcal from amino acids}$

$45 \text{ g} \times 10 \text{ kcal/g} = 450 \text{ kcal from fat}$

Total Energy = 2,101 kcal/day

Electrolytes are added to the PN formula to meet individual patient requirements.

Electrolyte additions to Parenteral Formulations

Electrolyte	Standard Requirements
Calcium	10-15 mEq
Magnesium	8-20 mEq
Phosphorous	20-40 mmol
Sodium	60 mEq
Potassium	60 mEq
Acetate	As needed to maintain acid-base balance
Chloride	As needed to maintain acid-base balance

b. Adequacy of Nutrition Rx

- This TPN prescription meets the needs of the patient in order to provide her the adequate nutrition she needs to reverse the effects of the diabetic ketoacidosis and come out of the coma.

c. Goals

- Goals should be individualized based on duration of diabetes, age/life expectancy, comorbid conditions, known cardiovascular disease, or advanced microvascular complications, hypoglycemia unawareness, and individual patient considerations.

d. Does it Meet DRI

- Yes the DRI is met by the TPN prescription given above.

#### **4. Education Material**

- a. Nutrition Therapy
  - The first priority for medical nutrition therapy for individuals who require insulin therapy is to identify a meal plan that can be used to integrate an insulin regimen into the person's usual eating habits and physical activity schedule.
- b. Ideas for Compliance
  - Compliance for this should be rather different because the patient is in a coma so the patient herself has no say in the matter.

#### **5. Sample Menu**

- a. Foods Recommended
  - Due to her NPO/ TPN prescription there is no food to be ingested by mouth.
- b. Foods to Avoid
  - Due to her NPO/ TPN prescription there is no food to be ingested by mouth.
- c. Example of a meal plan
  - Her meal plan is strictly through TPN feedings as indicated above.

#### **6. Websites**

- a. Organizations with Websites
  - American Diabetes Association  
1201 North Beauregard St.  
Alexandria, VA 22311  
Phone: 1-800-342-2383  
Website: <http://www.diabetes.org>
  - American Society for Parenteral and Enteral Nutrition  
8630 Fenton Street  
Silver Spring, MD 20910  
Phone: 301-587-6315  
Website: [www.nutritioncare.org](http://www.nutritioncare.org)
- b. Government Websites
  - National Diabetes Information Clearinghouse  
1 Information Way  
Bethesda, MD 20892  
Phone: 1-800-860-8747  
Website: [www.diabetes.niddk.nih.gov](http://www.diabetes.niddk.nih.gov)
  - Center for Disease Control and Prevention  
1600 Clifton Rd.  
Atlanta, GA 30333  
Phone: 1-800-232-4636  
Website: [www.cdc.gov/diabetes](http://www.cdc.gov/diabetes)

## 7. References

### a. Journal articles references

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doi:10.1007/s13410-011-0030-6
- Go, S.L., Osborn, H. A., & Kao, R. (2011). Diabetic Ketoacidosis Complicated by Brain Infarcts, Pulmonary Embolism, and Seizures. *Canadian Journal of General Internal Medicine*. 6(3), 81-82.
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- Thompson, R. (2011). Nurses as Educators. Comprehensive Case Study-Diabetic Ketoacidosis. *MEDSURG Nursing*, 20(6), 338-339.

