

Medical-Surgical Nursing: An Integrated Approach - Chapter 27

NURSING CARE OF THE CLIENT:
ENDOCRINE SYSTEM

NVOC 22C
Eliza Rivera-Mitu, RN, MSN

A Unique System

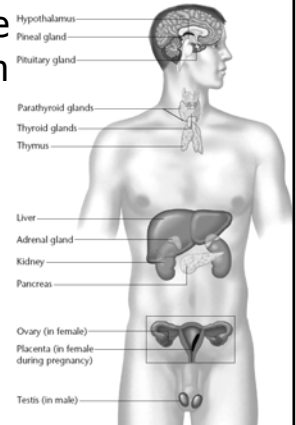
- The endocrine system is unique in that the components are not in direct physical contact but are scattered throughout the body.
- Like the nervous system, it provides communication and control, but is slower and has longer lasting control, which it exerts through the secretion of hormones.

Hormones

- Chemical substances that initiate or regulate activity of another organ, system, or gland in another part of the body.
- The level of hormone in the blood is regulated by the homeostasis mechanism known as *negative feedback*.

The Glands of the Endocrine System

- The pancreas.
- The pituitary gland.
- The hypothalamus.
- The thyroid.
- The parathyroid.
- The adrenals.



Anterior Pituitary

- Stimulates thyroid growth and secretion of the thyroid hormone.
- Stimulates adrenal cortex growth and secretion of glucocorticoids.
- Stimulates growth.
- Stimulates breast development during pregnancy and milk secretion.
- Causes increase in synthesis and spread of melanin (pigment) in skin.
- Stimulates estrogen production; causes ovulation; stimulates progesterone and testosterone.

Posterior Pituitary

- Stimulates water retention by kidneys to decrease urine secretion.
- Stimulates uterine contractions; causes breast to release milk into ducts.

Thyroid Gland

- Increases metabolic rate.
- Decreases blood calcium concentration.

Parathyroid Gland

- Increases blood calcium concentration.

Adrenal Cortex

- Stimulates gluconeogenesis and increases blood glucose; antiinflammatory; antiimmunity; antiallergy.
- Regulates electrolyte and fluid homeostasis.
- Stimulates sexual drive in females; in males, negligible effect.

Adrenal Medulla

- Prolongs and intensifies sympathetic nervous response to stress.

Assessment

- Assessment of the endocrine system can be challenging since the glands are scattered.
- Negative findings are as important as positive findings.

Diabetes Mellitus

- A disorder of metabolism which affects the production and secretion of *insulin*.
- Insulin is a hormone produced and secreted by beta cells in the islets of Langerhans in the pancreas. It stimulates the active transport of glucose into muscle and adipose tissue cells, making it available for cell use.

How Insulin Works

When we eat, food is broken down into chemicals and glucose enters bloodstream.

In response to elevated serum glucose, beta cell of pancreas secrete insulin into bloodstream.

Insulin combines with insulin receptors on cell wall (activating glucose transporters) allowing glucose to enter cell.

Hyperglycemia/Hypoglycemia

- A deficiency of insulin results in *hyperglycemia* (elevated blood glucose).
- An excess of insulin results in *hypoglycemia* (low blood glucose).

At-Risk for Diabetes

- Anyone age 45 and older.
- Anyone, regardless of age, with one of the following risk factors: Obesity; immediate family member with diabetes; member of high-risk ethnic group (African-American, Hispanic-American, some Native American groups)/
- Having a baby weighing more than 9 pounds.
- History of gestational diabetes mellitus.
- Hypertension.
- High-density lipoprotein level of 35 mg/dL or less, or a triglyceride level of 250 mg/dL or more.

Diabetic Control

- A coordinated program of exercise, diet, and medications is used to achieve diabetic control.
- Persons with type 1 diabetes always require insulin therapy in addition to dietary control and exercise. Persons with type 2 diabetes are managed through diet and exercise and may or may not require oral hypoglycemic agents or insulin.

Five Goals of Nutrition Therapy to Control Diabetes Mellitus

- Maintain as near-normal blood glucose level.
- Achieve optimal serum lipid levels.
- Provide adequate calories to maintain or attain a reasonable weight.
- Prevent and treat acute complications of insulin-treated diabetes.
- Improve overall health through optimal nutrition.

Symptoms of Acute Complications of Diabetes:

Hypoglycemia

- Mild Hypoglycemia:
 - Diaphoresis.
 - Pallor.
 - Paresthesias.
 - Excess hunger.
 - Palpitations.
 - Tremors.
 - Anxiety.
- Moderate Hypoglycemia:
 - Confusion, disorientation.
 - Slurred speech.
 - Behavior changes.
 - Irritability.

- Severe Hypoglycemia:
 - Seizures.
 - Loss of consciousness.
 - Shallow respirations.

Nursing Alert!
Severe hypoglycemia is a medical emergency. Administer some form of glucose immediately.

Symptoms of Acute Complications of Diabetes:
Hyperglycemia Hyperosmolar Nonketonic
(HHNK) Syndrome

- Polyuria.
- Polydipsia.
- Skin hot, dry, decreased turgor.
- Dehydration—hypotension, increased pulse.
- Blurred vision.
- Weakness.
- Mental status changes, confusion to coma.

Symptoms of Acute Complications of Diabetes:
Diabetic Ketoacidosis (DKA)

- Same as HHNK plus symptoms of acidosis:
 - “Fruity” odor to breath.
 - Kussmaul’s respirations (deep, nonlabored).

**Chronic Complications of
Diabetes**

- Infections (include diabetic foot infections, boils, cellulitis, urinary tract infections, yeast infections).
- Diabetic neuropathies.
- Nephropathy (Chronic renal failure).
- Retinopathy.
- Vascular changes.

Pituitary Disorders

- Hyperpituitarism:
 - *Gigantism*: proportional overgrowth of all body tissues.
 - *Acromegaly*: bone thickening with transverse growth and tissue enlargement.

Pituitary Disorders

- Hypopituitarism: a complex syndrome marked by metabolic dysfunction, sexual immaturity, and growth retardation.
 - *Simmonds’ Disease*: total absence of all pituitary secretions.
 - *Diabetes insipidus*: a deficiency of ADH.

**Thyroid Disorders:
Hyperthyroidism**

- A collective term for a condition marked by increased thyroid activity and overproduction of thyroid hormones thyroxine and triiodothyronine.

Thyroid Disorders: Hypothyroidism

- A condition in which the metabolic processes are decreased because of a deficiency of the thyroid hormone.
- Hypothyroid conditions include *cretinism*, *myxedema*, and *Hashimoto's thyroiditis*.

Cretinism

- Congenital condition d/t lack of thyroid hormone
- Defective physical development & mental retardation
- Large head, short limbs, puffy eyes, thick & protruding tongue, excessively dry skin, lack of coordination



Myxedema



In this patient with advanced pretibial myxedema, these striking skin changes are due to accumulations of mucopolysaccharides ("mucinoid") in the skin. These changes are reversible with thyroid hormone.

- s/s: energy loss, fatigue, forgetfulness, sensitivity to cold, unexplained weight gain, hypoventilation, constipation

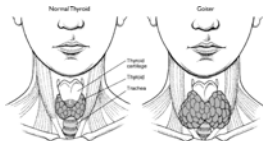


Hashimoto's Thyroiditis

- Some patients with Hashimoto's Thyroiditis may have no symptoms.
- common symptoms are fatigue, depression, sensitivity to cold, weight gain, forgetfulness, muscle weakness, puffy face, dry skin and hair, constipation, muscle cramps, and increased menstrual flow.
- Some patients have major swelling of the thyroid gland in the front of the neck, called goiter

Goiter

- An enlargement of the thyroid unrelated to inflammation or neoplasm.
- There are several types of goiters:
 - (i) benign
 - (ii) nodular
 - (iii) adenomatous growth
 - (iv) diffusely hyperplastic enlargement.



Parathyroid Disorders

- Hyperparathyroidism (overactivity).
- Hypoparathyroidism (deficiency of parathyroid hormone secretion).

Adrenal Disorders

- *Cushing's disease/syndrome* (Adrenal hyperfunction. Characteristic symptoms are moon-shaped face and buffalo hump)
- *Addison's disease* (Adrenal hypofunction. Characteristic symptom is bronze coloration of the skin).
- *Pheochromocytoma* (A rare disease characterized by paroxysmal or sustained hypertension due to excessive secretion of epinephrine or norepinephrine).

Cushing's Disease

Cushing's disease/syndrome –

↑ ACTH



Addison's disease

Addison's disease - ↓
mineralocorticoids,
glucocorticoids,
androgens

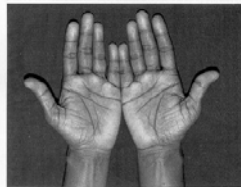
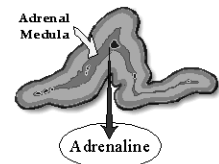


Fig. 2 Addison's disease - hyperpigmentation involving the palms of the hand.

Pheochromocytoma

- (A rare disease characterized by paroxysmal or sustained hypertension due to excessive secretion of epinephrine or norepinephrine).



A client with type 1 diabetes mellitus has a capillary blood glucose reading of 48 mg per dL. Which of these findings should the nurse expect to observe?

- Answer1: Cool, clammy skin.
- Answer2: Kussmaul respirations.
- Answer3: Decreased skin turgor.
- Answer4: Ketonuria.

- Rationale1: CORRECT. Hypoglycemia is a complication that occurs in clients with insulin dependent diabetes mellitus. Hypoglycemia is a blood sugar that is below 50 mg per dL. Common symptoms of hypoglycemia include weakness, hunger, diaphoresis, and nausea.
- Rationale2: INCORRECT. Kussmaul respirations occur with diabetic ketoacidosis (DKA) as the body compensates for the acidosis. With DKA, expect to see hyperglycemia (elevated blood glucose levels). Respirations that are rapid and deep are the body's attempt to compensate for the acidosis by blowing off excess ketone bodies.

- Rationale3:INCORRECT. Decreased skin turgor is a sign of hyperglycemia (elevated blood glucose levels) with diabetic ketoacidosis. Note that the client's blood glucose is 48 mg per dL, indicating hypoglycemia.
- Rationale4:INCORRECT. Ketones are found in the urine of a client with hyperglycemia (elevated blood glucose reading). Hyperglycemia is a complication that occurs in clients with insulin dependent diabetes mellitus. The presence of urine ketone bodies will be noted in a client with diabetic ketoacidosis (DKA). The glucose reading of 48 mg per dL indicates hypoglycemia (low blood glucose reading).

The nurse is caring for a client with hypoparathyroidism. Because of the potential electrolyte disturbance associated with this diagnosis, the nurse observes the client for evidence of:

- Answer1:Involuntary muscle spasms.
- Answer2:Hypertension.
- Answer3:Cold intolerance.
- Answer4:Weight loss.

- Rationale1:CORRECT. A decrease in parathormone secretion leads to hypocalcemia (decreased serum calcium levels), which may cause tetany. Involuntary muscle spasms are a common symptom associated with tetany.
- Rationale2:INCORRECT. The electrolyte that impacts hypertension is sodium. The parathyroid has no role in sodium regulation.

- Rationale3:INCORRECT. Perhaps, you were thinking of hypothyroidism. Cold intolerance would be a manifestation of hypothyroidism due to decreased metabolic rate. Read the question more carefully, and try again.
- Rationale4:INCORRECT. Perhaps, you were thinking of hyperthyroidism. Weight loss would be a manifestation of hyperthyroidism due to increased metabolic rate. Read the question more carefully, and try again.

Thyroid Storm

- an acute, life-threatening, thyroid hormone–induced hypermetabolic state in patients with thyrotoxicosis.
- may be the initial presentation of thyrotoxicosis in undiagnosed children.
- Common clinical presentation includes fever, tachycardia, neurologic abnormalities, and hypertension, followed by hypotension and shock.
- fatal if left untreated, rapid diagnosis and aggressive treatment are critical. Fortunately, this condition is extremely rare in children.

Thyroid Storm

- Thyroid storm is a decompensated state of thyroid hormone–induced, severe hypermetabolism involving multiple systems. Thyroid storm is the most extreme state of thyrotoxicosis.
- Heat intolerance and diaphoresis are common in simple thyrotoxicosis but manifest as hyperpyrexia in thyroid storm.

Thyroid Storm

- Cardiac findings of mild-to-moderate sinus tachycardia intensify to accelerated tachycardia, hypertension, high-output heart failure, and propensity to develop cardiac arrhythmia. Irritability and restlessness in simple thyrotoxicosis progress to severe agitation, delirium, seizures, and coma.
- GI involvement is manifested by diarrhea, vomiting, jaundice, and abdominal pain from mild elevation of transaminases and simple enhancement of intestinal transport in simple thyrotoxicosis. Extremely high metabolism also increases oxygen and energy consumption.

