

Diabetes Mellitus Management

Diabetes mellitus is a metabolic disorder resulting from either an inadequate production of insulin (type 1) or an inability of the body's cells to respond to insulin that is present (type 2).

Type 1 diabetes mellitus is an autoimmune dysfunction involving the destruction of beta cells, which produce insulin in the islets of Langerhans of the pancreas. Immune system cells and antibodies are present in circulation and can also be triggered by certain genetic tissue types or viral infections.

Type 2 diabetes mellitus is a progressive condition due to increasing inability of cells to respond to insulin (insulin resistance) and decreased production of insulin by the beta cells. It is linked to obesity, sedentary lifestyle, and heredity. Metabolic syndrome often precedes type 2 diabetes mellitus.

Diabetes mellitus has wide ranging systemic effects and is a contributing factor to development of cardiovascular disease, hypertension, kidney disease, neuropathy, retinopathy, peripheral vascular disease, and stroke.

Diabetes mellitus is significantly more prevalent in African American, American Indian, and Hispanic populations and is more common in men than women.

HEALTH PROMOTION AND DISEASE PREVENTION

Diabetic screening

- Determine risk factors: obesity, hypertension, sedentary lifestyle, hyperlipidemia, cigarette smoking, genetic history, ethnic group, and women who have polycystic ovary syndrome or delivered infants weighing more than 9 lb.
- The American Diabetes Association recommends screening a client who has a BMI greater than 25 and age greater than 45 years, or if a child is overweight and has additional risk factors.
- Screening is done with fasting serum glucose levels or glycosylated hemoglobin (A1C).

CLIENT EDUCATION

- Teach the client that exercise and good nutrition are necessary for preventing or controlling diabetes.
 - Carbohydrates: 45% of total daily intake
 - Protein: 15% to 20% of total daily intake, depending upon kidney function
 - Unsaturated and polyunsaturated fats: 20% to 35% of total daily intake
- Consistency in the amount of food consumed and regularity in meal times promotes blood glucose control.
- Encourage a diet low in saturated fats to decrease low-density lipoprotein (LDL), assist with weight loss for secondary prevention of diabetes, and reduce risk of heart disease.
- Modify the client's diet to include omega-3 fatty acids and fiber to lower cholesterol, improve blood glucose for clients who have diabetes, for secondary prevention of diabetes, and to reduce the risk of heart disease.
- Encourage physical activity at least three times per week.

ASSESSMENT

RISK FACTORS

Metabolic syndrome: A collection of manifestations that predispose an individual to the development of diabetes mellitus including abdominal obesity, insulin resistance, sedentary lifestyle, hypertension, and elevated lipid and triglyceride levels. It also has an associated risk of cardiovascular disease.

Insulin resistance: Impaired fasting glucose levels 100 to 125 mg/dL, impaired glucose tolerance 140 to 199 mg/dL, or A1C level 5.5% to 6.0%.

- Pancreatitis and Cushing's syndrome are secondary causes of diabetes.
- Vision and hearing deficits can interfere with the understanding of teaching, reading of materials, and preparation of medications.
- Tissue deterioration secondary to aging can affect the client's ability to prepare food, care for self, perform ADLs, perform foot/wound care, and perform glucose monitoring.
- A fixed income can mean that there are limited funds for buying diabetic supplies, wound care supplies, insulin, and medications. This can result in complications.

Age

- Older adult clients might not be able to drive to the provider's office, grocery store, or pharmacy. Assess support systems available for older adult clients. ☹
- Older adults are at risk for altered metabolism of medication due to decreased kidney and liver function because of the aging process.
- Older adults can have vision alterations (yellowing of lens, decreased depth perception, cataracts), which can affect ability to read information and administer medication.

EXPECTED FINDINGS

Hyperglycemia: Blood glucose level usually greater than 250 mg/dL

Polyuria: Excess urine production and frequency from osmotic diuresis

Polydipsia: Excessive thirst due to dehydration

- Loss of skin turgor, skin warm and dry
- Dry mucous membranes
- Weakness and malaise
- Rapid weak pulse and hypotension

Polyphagia: Excessive hunger and eating caused from inability of cells to receive glucose (because of a lack of insulin or cellular resistance to available insulin) and the body's use of protein and fat for energy (which causes ketosis)

- The client can display weight loss.
- Ketones accumulate in the blood due to breakdown of fatty acids when insulin is not available, resulting in metabolic acidosis.
- Kussmaul respirations: increased respiratory rate and depth in attempt to excrete carbon dioxide and acid due to metabolic acidosis.

OTHER MANIFESTATIONS: Acetone/fruity breath odor (due to accumulation of ketones), headache, nausea, vomiting, abdominal pain, inability to concentrate, fatigue, weakness, vision changes, slow healing of wounds, decreased level of consciousness, seizures leading to coma

LABORATORY TESTS

Diagnostic criteria for diabetes include two findings (on separate days) of at least one of the following.

- Manifestations of diabetes plus casual blood glucose concentration greater than 200 mg/dL (without regard to time since last meal)
- Fasting blood glucose greater than 126 mg/dL
- 2-hr glucose greater than 200 mg/dL with oral glucose tolerance test
- Glycosylated hemoglobin (A1C) greater than 6.5%

Fasting blood glucose

NURSING ACTIONS: Postpone administration of antidiabetic medication until after the level is drawn.

CLIENT EDUCATION: Instruct the client to fast (no food or drink other than water) for the 8 hr prior to the blood test.

Oral glucose tolerance test

- Often used to diagnose gestational diabetes mellitus during pregnancy
- Not generally used for routine diagnosis
- A fasting blood glucose level is drawn at the start of the test. The client is then instructed to consume a specified amount of glucose. Blood glucose levels are obtained every 30 min for 2 hr. The clients must be assessed for hypoglycemia throughout the procedure.

CLIENT EDUCATION

- Instruct the client to consume a balanced diet for 3 days prior to the test. Then instruct the client to fast for 10 to 12 hr prior to the test.
- Only water may be taken during the testing period. Food or other liquids will affect the test results.

Glycosylated hemoglobin (HbA1c)

- The expected reference range is 4% to 6%, but an acceptable reference range for clients who have diabetes can be 6.5% to 8%, with a target goal of less than 7%.
- HbA1c is the best indicator of the average blood glucose level for the past 120 days. It assists in evaluating treatment effectiveness and compliance.

CLIENT EDUCATION

- Instruct the client that the test evaluates treatment effectiveness and compliance.
- Recommended quarterly or twice yearly depending on the glycemic levels.

Urine ketones

High ketones in the urine associated with hyperglycemia (exceed 300 mg/dL) is a medical emergency.

DIAGNOSTIC PROCEDURES

Self-monitored blood glucose (SMBG)

NURSING ACTION: Ensure that the client follows the proper procedure for blood sample collection and use of a glucose meter. Supplemental short-acting insulin may be prescribed for elevated pre-meal glucose levels.

CLIENT EDUCATION

- Instruct the client to check the accuracy of the strips with the control solution provided.
- Instruct the client to use the correct code number in the meter to match the strip bottle number.
- Instruct the client to store strips in the closed container in a dry location.
- Instruct the client to obtain an adequate amount of blood sample when performing the test.
- Encourage appropriate hand hygiene.
- Encourage use of fresh lancets, and avoid sharing glucose monitoring equipment to prevent infection.
- Advise the client to keep a record of the SMBG that includes time, date, serum glucose level, insulin dose, food intake, and other events that can alter glucose metabolism, such as activity level or illness.

MEDICATIONS

- Insulin regimens are established for clients who have type 1 diabetes mellitus
 - More than 1 type of insulin: rapid-, short-, intermediate-, and long-acting
 - Given one or more times a day based on blood glucose results
- Insulin can be required by some clients who have type 2 diabetes or gestational diabetes if glycemic control is not obtained with diet, exercise, and oral hypoglycemic agents.
 - Continuous infusion of insulin can be accomplished using a small pump that is worn externally. The pump is programmed to deliver insulin through a needle in subcutaneous tissue. The needle should be changed at least every 2 to 3 days to prevent infection.
 - Complications of the insulin pump are accidental cessation of insulin administration, obstruction of the tubing/needle, pump failure, and infection.
- Insulin pens are prefilled cartridges of 150 to 300 units of insulin in a programmable device with disposable needles.
 - Used if only one insulin is given at a time
 - Convenient for travel
 - Used for clients who have vision impairment or problems with dexterity
- Oral hypoglycemics are used by clients who have type 2 diabetes, along with diet and exercise, to regulate blood glucose.

Insulin

Also see the **RN PHARMACOLOGY REVIEW MODULE: CHAPTER 39: DIABETES MELLITUS**.

Rapid-acting insulin: Insulin lispro, insulin aspart, insulin glulisine

- Administer before meals to control postprandial rise in blood glucose.
- Onset is rapid (10 to 30 min), depending on which insulin is administered.
- Administer in conjunction with intermediate- or long-acting insulin to provide glycemic control between meals and at night.

Short-acting insulin: Regular insulin

- Administer 30 to 60 min before meals to control postprandial hyperglycemia.
- Regular insulin is available in two concentrations.
 - U-500 is reserved for the client who has insulin resistance. It is never administered IV.
 - U-100 is prescribed for most clients and may be administered IV.

Intermediate-acting insulin: NPH insulin

- Administered for glycemic control between meals and at night.
- Not administered before meals to control postprandial rise in blood glucose.
- Contains protamine (a protein), which causes a delay in the insulin absorption or onset and extends the duration of action of the insulin.
- Administer NPH insulin subcutaneous only and as the only insulin to mix with short-acting insulin.

82.1 Hypoglycemia and hyperglycemia manifestations and management

Hypoglycemia

- Teach the client measures to take in response to manifestations of hypoglycemia (mild shakiness, mental confusion, sweating, palpitations, headache, lack of coordination, blurred vision, seizures, and coma).
- Hypoglycemia preventive measures are to avoid excess insulin, exercise, and alcohol consumption on an empty stomach.
- A decrease in food intake or delay in food absorption can also cause hypoglycemia.
- Check blood glucose level.
- Follow guidelines outlined by the provider or diabetes educator.
- Instruct the client who has hypoglycemia (glucose of 70 mg/dL or less) to take 15 to 20 g of a readily absorbable carbohydrate (4 to 6 oz of fruit juice or regular soft drink, glucose tablets or glucose gel per package instructions, 6 to 10 hard candies, or 1 tbsp of honey) and recheck blood glucose in 15 min.
- Repeat the administration of carbohydrates if not within normal limits, and recheck blood glucose in 15 min.
- If blood glucose is within normal limits, have a snack containing a carbohydrate and protein (if the next meal is more than 1 hr away). Blood glucose increases approximately 40 mg/dL over 30 min following ingestion of 10 g of absorbable carbohydrate.
- If the client is unconscious or unable to swallow, administer glucagon subcutaneous or IM (repeat in 10 min if still unconscious) and notify the provider. Place the client into a lateral position to prevent aspiration.
- In acute care, the nurse should administer 50% dextrose if IV access is available. Consciousness should occur within 20 min.
- Once consciousness occurs and the client is able to swallow, have the client ingest oral carbohydrates.

Hyperglycemia

- Teach the client manifestations of hyperglycemia (hot, dry skin and fruity breath) and measures to take in response to hyperglycemia.
- Encourage oral fluid intake of sugar-free fluids to prevent dehydration.
- Administer insulin as prescribed.
- Restrict exercise when blood glucose levels are greater than 250 mg/dL.
- Test urine for ketones and report if outside of the expected reference range.
- Consult the provider if manifestations progress.

Long-acting insulin: Insulin glargine, insulin detemir

- Administered once daily, anytime during the day but always at the same time each day.
- Glargine insulin forms microprecipitates that dissolves slowly over 24 hr and maintains a steady blood sugar level with no peaks or troughs.
- Insulin detemir has an added fatty-acid chain that delays absorption. Although it does not have a peak, duration is dose-dependent (12 to 24 hr).
- Administer glargine insulin and insulin detemir subcutaneous only. Never administer IV.

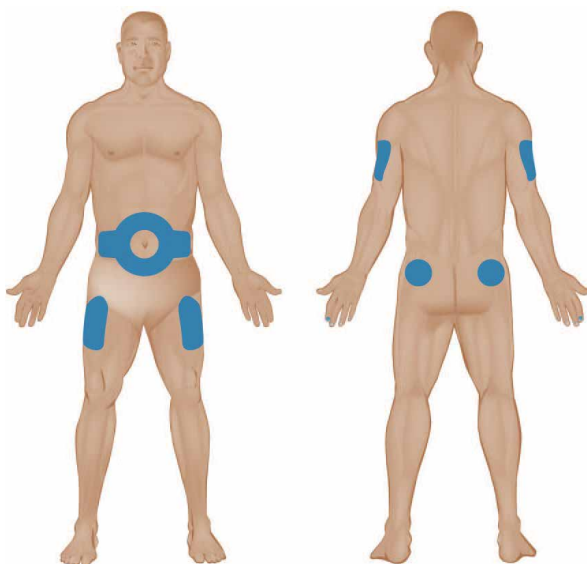
NURSING CONSIDERATIONS

- Observe the client perform self-administration of insulin, and offer additional instruction as indicated.
- Monitor for hypoglycemic reactions (sweating, weakness, dizziness, confusion, headache, tachycardia, slurred speech) at insulin peak times.
- Dosage can be adjusted when the client is scheduled for procedures that require fasting.

CLIENT EDUCATION

- Provide information regarding self-administration of insulin.
 - Rotate injection sites (to prevent lipohypertrophy) within one anatomic site (to prevent day-to-day changes in absorption rates).
 - Inject at a 90° angle (45° angle if the client is thin). Aspiration for blood is not necessary.
 - When mixing a rapid- or short-acting insulin with a longer-acting insulin, draw up the shorter-acting insulin into the syringe first and then the longer-acting insulin. This reduces the risk of introducing the longer-acting insulin into the shorter-acting insulin vial.
- Advise the client to eat at regular intervals, avoid alcohol intake, and adjust insulin to exercise and diet to avoid hypoglycemia.
- Encourage the client to wear a medical identification wristband.

82.2 Insulin subcutaneous injection site



Oral hypoglycemics

Biguanides: Metformin

- Reduces the production of glucose by the liver (gluconeogenesis)
- Increases tissue sensitivity to insulin
- Slows carbohydrate absorption in the intestines
- **NURSING CONSIDERATIONS**
 - Monitor significance of gastrointestinal (GI) effects (flatulence, anorexia, nausea, vomiting).
 - Monitor for lactic acidosis, especially in clients who have kidney disorders or liver dysfunction.
 - Stop medication for 48 hr before any type of elective radiographic test with iodinated contrast dye and restart 48 hr after (can cause lactic acidosis due to acute kidney injury).
- **CLIENT EDUCATION**
 - Take with food to decrease adverse GI effects.
 - Instruct the client to take vitamin B₁₂ and folic acid supplements.
 - Contact the provider if manifestations of lactic acidosis develop (myalgia, sluggishness, somnolence, and hyperventilation).
 - May be taken during pregnancy for gestational diabetes.
 - Never crush or chew the medication.

Second-generation sulfonylureas: Glipizide, glimepiride, glyburide

- Stimulates insulin release from the pancreas causing a decrease in blood sugar levels.
- Increases tissue sensitivity to insulin.
- **NURSING CONSIDERATIONS**
 - Monitor for hypoglycemia.
 - Beta-blockers can mask tachycardia typically seen during hypoglycemia.
- **CLIENT EDUCATION**
 - Administer 30 min before meals.
 - Monitor for hypoglycemia and report frequent episodes to the provider.
 - Instruct the client to avoid alcohol due to disulfiram effect.

Meglitinides: Repaglinide, nateglinide

- Stimulates insulin release from pancreas.
- Administered for post-meal hyperglycemia.
- **NURSING CONSIDERATIONS**
 - Monitor for hypoglycemia.
 - Monitor HbA_{1c} every 3 months to determine effectiveness.
- **CLIENT EDUCATION**
 - Administer 15 to 30 min before a meal.
 - Must eat with 30 min of administration.
 - Omit the dose if skipped a meal to prevent hypoglycemic crisis.

Thiazolidinediones: Pioglitazone

- Reduces the production of glucose by the liver (gluconeogenesis)
- Increases tissue sensitivity to insulin
- **NURSING CONSIDERATIONS**
 - Monitor for fluid retention, especially in clients who have a history of heart failure.
 - Monitor for elevation of ALT, LDH, and triglycerides levels.

- **CLIENT EDUCATION**

- Report rapid weight gain, shortness of breath, or decreased exercise tolerance.
- Use additional contraception methods because the medication reduces the blood levels of oral contraceptives and stimulate ovulation.
- Have liver function tests at baseline and every 3 to 6 months thereafter.

Alpha-glucosidase inhibitors: Acarbose, miglitol

- Slow carbohydrate absorption from the intestinal tract
- Reduces post-meal hyperglycemia

- **NURSING CONSIDERATIONS**

- Alert the client that GI discomfort (abdominal distention, cramps, excessive gas, diarrhea) is common with these medications.
- Monitor liver function every 3 months.
- Treat hypoglycemia with dextrose, not table sugar (prevents table sugar from breaking down).

- **CLIENT EDUCATION**

- Instruct the client to have liver function tests performed every 3 months or as prescribed.
- Take the medication with the first bite of each meal in order for the medication to be effective.
- Have available dextrose paste to treat hypoglycemia.

Dipeptidyl peptidase-4 (DPP-4) inhibitors: Sitagliptin, saxagliptin, linagliptin, alogliptin

- Augments naturally occurring intestinal incretin hormones, which promote release of insulin and decrease secretion of glucagon
- Lowers fasting and postprandial glucose levels

- **NURSING CONSIDERATIONS**

- Few adverse effects, but upper respiratory manifestations (nasal and throat inflammation) and pancreatitis can occur.
- Alert the client of GI discomforts (nausea, vomiting, and diarrhea).

- **CLIENT EDUCATION**

- Instruct the client to report persistent upper respiratory manifestations.
- Instruct the client to report severe abdominal pain, with or without emesis.
- Medication only works when blood sugar is rising.

Incretin mimetic: Exenatide, liraglutide

- Mimics the function of intestinal incretin hormone by decreasing glucagon secretion and gastric emptying.
- Decrease insulin demand by reducing fasting and postprandial hyperglycemia.

- **NURSING CONSIDERATIONS**

- Administer subcutaneously 60 min before morning and evening meal.
- Monitor for gastrointestinal distress.

- **CLIENT EDUCATION**

- Do not administer after a meal.
- Oral antibiotic, oral contraceptive, or acetaminophen should never be given within 1 hr of oral exenatide or 2 hr after an injection of exenatide.
- Can have decreased appetite and weight loss.
- Wait for next scheduled dose if the scheduled medication is missed.
- Instruct the client to report severe abdominal pain, with or without emesis.

Amylin mimetic: Pramlintide

- A synthetic amylin hormone found in the beta cells of the pancreas, it suppresses glucagon secretion and controls postprandial blood glucose levels.

- **NURSING CONSIDERATIONS**

- Administer subcutaneously immediately before each major meal.
- Do not administer if client has hypoglycemia unawareness, or noncompliance/poor adherence to treatment regimens and self-monitoring blood glucose.
- It may be administered with insulin therapy or oral hypoglycemic agent.
- Pre-meal doses of rapid- or short-acting insulins should be reduced by 50% to reduce risk of hypoglycemia.

- **CLIENT EDUCATION**

- Monitor and report frequent periods of hypoglycemia.
- Monitor for injection site reactions.

Sodium-glucose cotransporter 2 inhibitors: Canagliflozin, dapagliflozin

- Blocks reabsorption of glucose from the kidneys

- **NURSING CONSIDERATIONS**

- Monitor for development of urinary tract infections, and genital yeast infections in women.
- Monitor for postural hypotension in older adult clients.

- **CLIENT EDUCATION**

- Take the medication before the first meal of the day.
- Change positions slowly.
- Monitor and report genital burning, itching, increased drainage.

PATIENT-CENTERED CARE

NURSING CARE

Monitor the following.

- Blood glucose levels and factors affecting levels (other medications)
- I&O and weight
- Skin integrity and healing status of any wounds for presence of recurrent infections (feet and folds of the skin should be monitored)
- Sensory alterations (tingling, numbness)
- Visual alterations
- Dietary practices
- Exercise patterns
- SMBG skill proficiency
- Self-medication administration proficiency

- **CLIENT EDUCATION**

- Teach the client appropriate techniques for SMBG, including obtaining blood samples, recording and responding to results, and correctly handling supplies and equipment.
- Provide information regarding self-administration of insulin.
- Rotate injection sites to prevent lipohypertrophy (increased swelling of fat) or lipoatrophy (loss of fat tissue) within one anatomic site (prevents day-to-day changes in absorption rates).

Foot care

- Inspect feet daily. Wash feet daily with mild soap and warm water. Test water temperature with hands before washing feet.
- Pat feet dry gently, especially between the toes, and avoid lotions between toes to decrease excess moisture and prevent infection.
- Use mild foot powder (powder with cornstarch) on sweaty feet.
- Do not use commercial remedies for the removal of calluses or corns, which can increase the risk for tissue injury and infection.
- Consult a podiatrist.
- The best time to perform nail care is after a bath/shower, when toenails are soft and easier to trim.
- Separate overlapping toes with cotton or lamb's wool.
- Avoid open-toe, open-heel shoes. Leather shoes are preferred to plastic. Wear shoes that fit correctly. Wear slippers with soles. Do not go barefoot.
- Wear clean, absorbent socks or stockings that are made of cotton or wool and have not been mended.
- Do not use hot water bottles or heating pads to warm feet. Wear socks for warmth.
- Avoid prolonged sitting, standing, and crossing of legs.
- Teach the client to follow facility policies or recommendations of a podiatrist for nail care. Some protocols allow for trimming toenails straight across with clippers and filing edges with an emery board or nail file to prevent soft tissue injury. If clippers or scissors are contraindicated, the client should file the nails straight across.
- Teach the client to cleanse cuts with warm water and mild soap, gently dry, and apply a dry dressing. Instruct the client to monitor healing and to seek intervention promptly.

Nutritional guidelines

- Consult a dietitian for collaborative education with the client and family on meal planning to include food intake, weight management, and lipid and glucose management. 
- Plan meals to achieve appropriate timing of food intake, activity, onset, and peak of insulin. Calories and food composition should be similar each day. Eat at regular intervals, and do not skip meals.
- Count grams of carbohydrates consumed for glycemic control.
- Recognize that 15 g carbohydrates is equal to 1 carbohydrate exchange.
- Restrict calories and increase physical activity as appropriate to facilitate weight loss (for clients who are obese) or to prevent obesity.
- Include fiber in the diet to increase carbohydrate metabolism and to help control cholesterol levels.
- Use artificial sweeteners.
- Read and interpret fat content information on food labels to keep saturated fats within 7% of the recommendations of the daily total caloric intake.

Illness

Teach the client guidelines to follow when sick.

- Monitor blood glucose every 3 to 4 hr.
- Continue to take insulin or oral hypoglycemic agents.
- Consume 4 oz of sugar-free, noncaffeinated liquid every 30 min to prevent dehydration.
- Meet carbohydrate needs through soft food (custard, cream soup, gelatin, graham crackers) six to eight times per day, if possible. If not, consume liquids equal to usual carbohydrate content.
- Test urine for ketones and report to provider if they are outside the expected reference range. (The level should be negative to small.)
- Rest.
- Call the provider for the following.
 - Blood glucose greater than 240 mg/dL. Test urine for ketones, if prescribed.
 - Fever greater than 38.6° C (101.5° F), does not respond to acetaminophen, or lasts more than 24 hr.
 - Feeling disoriented or confused
 - Experiencing rapid breathing
 - Vomiting that occur more than once
 - Diarrhea that occurs more than five times or for longer than 24 hr
 - Inability to tolerate liquids
 - Illness that lasts longer than 2 days

INTERPROFESSIONAL CARE

Refer the client to a diabetes educator for comprehensive education in diabetes management.

COMPLICATIONS

Consistent maintenance of blood glucose within the expected reference range is the best protection against the complications of diabetes mellitus. Expected reference ranges can vary.

Cardiovascular and cerebrovascular disease

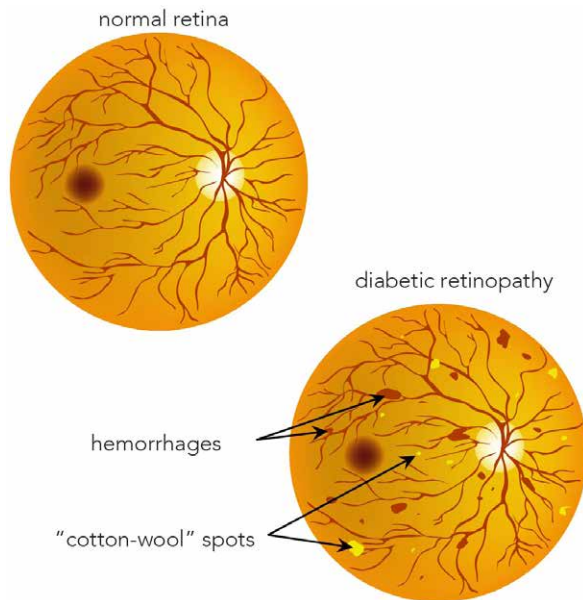
Hypertension, myocardial infarction, and stroke

NURSING ACTIONS: Monitor blood pressure.

CLIENT EDUCATION

- Encourage checks of cholesterol (HDL, LDL, and triglycerides) yearly, and monitoring of blood pressure (less than 130/80 mm Hg) and HbA1c every 3 months.
- Encourage participation in regular activity for weight loss and control.
- Encourage a diet of low-fat meals that are high in fruits, vegetables, and whole grains.
- Teach the client to report shortness of breath, headaches (persistent and transient), numbness in distal extremities, swelling of feet, infrequent urination, and changes in vision.
- Encourage a dietary consult.

82.3 Diabetic retinopathy



82.4 Diabetic foot ulcers



Diabetic retinopathy

Impaired vision and blindness

CLIENT EDUCATION

- Encourage yearly eye exams to ensure the health of the eyes and to protect vision.
- Encourage management of blood glucose levels.

Diabetic neuropathy

- Caused from damage to sensory nerve fibers resulting in numbness and pain
- Is progressive, can affect every aspect of the body, and can lead to ischemia and infection

NURSING ACTIONS

- Monitor blood glucose to keep within an acceptable range to slow progression.
- Provide foot care.

CLIENT EDUCATION

- Encourage annual exams by a podiatrist.
- Encourage regular follow-up with provider to assess and treat neuropathy.

Diabetic nephropathy

Damage to the kidneys from prolonged elevated blood glucose levels and dehydration

NURSING ACTIONS

- Monitor hydration and kidney function (I&O, serum creatinine).
- Report an hourly output less than 30 mL/hr.
- Monitor blood pressure.

CLIENT EDUCATION

- Encourage yearly urine analysis, BUN, microalbumin, and serum creatinine.
- Encourage the client to avoid soda, alcohol, and toxic levels of acetaminophen or NSAIDs.
- Teach the client to consume 2 to 3 L/day of fluid from food and beverages with artificial sweetener, and to drink an adequate amount of water.
- Tell the client to report decrease in output to the provider.

Application Exercises

1. A nurse is caring for a client who has blood glucose 52 mg/dL. The client is lethargic but arousable. Which of the following actions should the nurse perform first?
 - A. Recheck blood glucose in 15 min.
 - B. Provide a carbohydrate and protein food.
 - C. Provide 4 oz grape juice.
 - D. Report findings to the provider.
2. A nurse is preparing to administer a morning dose of insulin aspart to a client who has type 1 diabetes mellitus. Which of the following actions should the nurse implement?
 - A. Check blood glucose immediately after breakfast.
 - B. Administer insulin when breakfast arrives.
 - C. Hold breakfast for 1 hr after insulin administration.
 - D. Clarify the prescription because insulin should not be administered at this time.
3. A nurse is preparing to administer morning doses of insulin glargine and regular insulin to a client who has a blood glucose 278 mg/dL. Which of the following actions should the nurse take?
 - A. Draw up the regular insulin and then the glargine insulin in the same syringe.
 - B. Draw up the glargine insulin then the regular insulin in the same syringe.
 - C. Draw up and administer regular and glargine insulin in separate syringes.
 - D. Administer the regular insulin, wait 1 hr, and then administer the glargine insulin.
4. A nurse is presenting information to a group of clients about nutrition habits that prevent type 2 diabetes mellitus. Which of the following should the nurse include in the information? (Select all that apply.)
 - A. Eat less meat and processed foods.
 - B. Decrease intake of saturated fats.
 - C. Increase daily fiber intake.
 - D. Limit saturated fat intake to 15% of daily caloric intake.
 - E. Include omega-3 fatty acids in the diet.
5. A nurse is teaching foot care to a client who has diabetes mellitus. Which of the following information should the nurse include in the teaching? (Select all that apply.)
 - A. Remove calluses using over-the-counter remedies.
 - B. Apply lotion between toes.
 - C. Perform nail care after bathing.
 - D. Trim toenails straight across.
 - E. Wear closed-toe shoes.

PRACTICE Active Learning Scenario

A nurse is providing guidelines to a client who has type 1 diabetes mellitus about self-care during illness. What information should the nurse include in the guidelines? Use the ATI Active Learning Template: System Disorder to complete this item.

LABORATORY TESTS: Discuss parameters for testing urine and notifying the provider.

CLIENT EDUCATION: Describe six teaching points.

Application Exercises Key

1. A. The nurse should recheck the blood glucose in 15 min after a rapidly absorbed carbohydrate is ingested; however, another action is the priority.
B. The nurse should give the client a carbohydrate and protein food if the next meal is more than 1 hr away after the blood glucose returns to a normal range; however, the nurse should take another action first.
C. **CORRECT:** The greatest risk to the client is injury from hypoglycemia; therefore, the priority action the nurse should take is to administer a rapidly absorbed carbohydrate, such as grape juice, takes priority when treating the blood glucose of 52 mg/dL.
D. The nurse should report the findings to the provider; however, the nurse should take another action first.
NCLEX® Connection: Physiological Adaptation, Unexpected Response to Therapies
2. A. Blood glucose should be checked prior to insulin administration to prevent an episode of hypoglycemia.
B. **CORRECT:** Administer insulin aspart when breakfast arrives to avoid a hypoglycemic episode. Insulin aspart is rapid-acting, and should be administered 5 to 10 min before breakfast.
C. Insulin aspart is rapid-acting and is administered 5 to 10 min before breakfast. Breakfast should be available at the time of the injection.
D. Insulin aspart is administered at breakfast time and may be prescribed for administration 2 to 3 times a day.
NCLEX® Connection: Pharmacological and Parenteral Therapies, Medication Administration
3. A. These insulins are not compatible and should not be drawn up in the same syringe.
B. These insulins are not compatible and should not be drawn up in the same syringe.
C. **CORRECT:** Administer each insulin as a separate injection. These insulins are not compatible and should not be drawn up in the same syringe.
D. These insulins should be administered at the same time. Regular insulin is short-acting and should lower the blood glucose level in a short period of time. Insulin glargine is long-acting and administered once a day.
NCLEX® Connection: Pharmacological and Parenteral Therapies, Medication Administration
4. A. **CORRECT:** Healthy nutrition should include decreasing the consumption of meats and processed foods, which can prevent diabetes and hyperlipidemia.
B. **CORRECT:** Healthy nutrition should include lowering LDL by decreasing intake of saturated fats, which can prevent diabetes and hyperlipidemia.
C. **CORRECT:** Healthy nutrition should include increasing dietary fiber to control weight gain and decrease the risk of diabetes and hyperlipidemia.
D. The recommended saturated fat intake is no more than 7% of total daily caloric intake.
E. **CORRECT:** Healthy nutrition should include omega-3 fatty acids for secondary prevention of diabetes and heart disease.
NCLEX® Connection: Basic Care and Comfort, Nutrition and Oral Hydration
5. A. A podiatrist should remove calluses or corns. Over-the-counter remedies can increase the risk for tissue injury and an infection.
B. Applying lotion between the toes increases moisture for growth of micro-organisms, which can lead to infection.
C. **CORRECT:** Perform nail care after bathing, when toenails are soft and easier to trim.
D. **CORRECT:** Trim toenails straight across to prevent injury to soft tissue of the toes.
E. **CORRECT:** Wear closed-toe shoes to prevent injury to soft tissue of the toes and feet.
NCLEX® Connection: Health Promotion and Maintenance, Health Promotion/Disease Prevention

PRACTICE Answer

Using the ATI Active Learning Template: System Disorder

LABORATORY TESTS: Test urine for ketones and report to provider if they are outside the expected reference range. (The level should be negative.)

CLIENT EDUCATION

- Monitor blood glucose every 3 to 4 hr.
- Continue to take insulin as prescribed.
- Prevent dehydration by consuming 2 to 3 L/day of fluid obtained from food and beverages with artificial sweetener and drinking an adequate amount of water.
- Call the provider if unable to tolerate liquids.
- If unable to eat soft foods, consume liquids equal to usual carbohydrate content.
- Call the provider for illness longer than 2 days, or diarrhea more than five episodes or for longer than 24 hr.
- Call the provider for fever that is greater than 38.6° C (101.5° F), does not respond to acetaminophen, or lasts more than 24 hr.

NCLEX® Connection: Physiological Adaptation, Illness Management