Lesson 60: Diabetic Testing (Urine and Finger Stick)

I. Diabetic Urine Testing

A. Introduction

1. Characteristics of urine
   a. color
   b. odor
   c. clarity
   d. protein
   e. blood
   f. glucose
   g. ketone bodies
   h. pH
2. Analysis of information by the physician and nursing staff can affect the treatment of a diabetic resident.
3. Types of information the QMA would be required to document when conducting diabetic urine testing include the outcome of tests for ketones, protein and glucose.
4. The purpose of the testing is to screen for renal or urinary tract disease and to detect metabolic or systemic disease related to renal disorders.

B. Interpretation of Chemical Testing of Urine:

1. Ketones: A test for the presence of ketone bodies is also referred to as testing for acetone. Acetone is present when fats are not properly oxidized.
   a. Ketone bodies are products of incomplete fat metabolism.
   b. Acetone is the most common ketone
   c. Ketones are present in cases of uncontrolled diabetes mellitus and starvation.
   d. Ketones can be present in large amounts in the urine before any elevation would be indicated in the plasma level.
2. Protein molecules such as albumin, fibrinogen and globulin are filtered through the kidneys into the urine.
   a. Albumin is the smallest molecule of the three.
   b. The presence of protein in the urine is often tested by determining the presence of albumin.
   c. A reagent strip is used to conduct this test.
3. The presence of protein in the urine is called ***proteinuria***; the presence of albumin is referred to as albuminuria.
4. Glucose testing is conducted to detect diabetes mellitus or to follow the progress of a resident known to have diabetes mellitus.
   a. The presence of glucose in urine is called glycosuria or glucosuria.
   b. Commercial tests commonly used to test for the presence of glucose in the urine are Clinitest Tablets, Clinistix, Diastix and TesTape reagent strips.
   c. Each uses a color scale to measure the amount of glucose present. These scales are different for each product and are not interchangeable.
   d. A freshly voided specimen is used, but more often a second voided specimen is required in that it more closely reflects the most current characteristics common to the resident.
   e. The urine collected in the bladder overnight reflects the condition of the body at the time the urine was produced. Thus, a specimen collected 30 minutes after the initial void reflects the most current condition of the resident.
   f. The manufacturer's recommendations for documenting these results are usually stated as:

      i. negative
      ii. trace
      iii. one plus (1+ or +)
      iv. two plus (2+ or ++)

v. three plus (3+ or +++), etc.
Each of these grades reflect the percentage of glucose and can vary from product to product.

g. Follow the instructions provided by the licensed nurse or from the physician's order to determine what product to use for the individual resident.

5. pH reflects the acidity of urine. This test can be conducted utilizing reagent paper.
   a. The reagent paper will change color to reflect the pH content present in the urine.
   b. Urine that is left at room temperature for several hours will gradually become more alkaline due to the bacterial action.

C. Storage of Test Strips
1. Store at room temperature between 15° to 30° Celsius. (59-86° Fahrenheit)
2. All test strips should be stored in the original container.
3. Do not remove desiccant from bottle.
4. Remove as many strips as required for testing and immediately recap the container tightly.
5. Do not use after expiration date.

D. General Rules for Urine Testing
1. Fresh Specimen
   a. Always test a fresh specimen. Use a second voided specimen within 30 minutes, whenever possible. Bacterial growth in room temperature urine changes the number of ketones present.
2. Exact Timing
   a. Wait the exact amount of time specified for each test before evaluating the results. Exact timing is necessary for accurate results.
3. Do not touch tablets
   a. Do not allow the tablets used in the test to touch your hands.
4. No Tablets in Medication Cups:
   a. Never put the test tablets in medication cups. They might be mistaken for medication to be taken internally.
5. Use Rack:
   a. When performing the Clinitest, do NOT hold the test tube in your hand. The chemical can cause burns while the solution is boiling.

E. Procedure
1. Specimen Collection
   a. Collect urine in a clean container.
   b. Wash hands and put on gloves before collecting the specimen.
   c. Test urine sample as soon as possible after collection.
   d. Refrigerate urine sample immediately if the sample cannot be tested within one hour. If refrigerated, bring refrigerated sample to room temperature and mix thoroughly before testing.
   e. Handle the urine sample as if it is potentially infectious.
   f. Pour a small portion of the urine sample into another container for testing in order to avoid contamination of the whole urine sample.
   g. After completing the ordered test, dispose of all waste material and wash your hands.

2. Testing the Specimen
   a. Four different tests are commonly used for diabetic urine testing:
      i. Clinitest
      ii. Acetest
      iii. TesTape
      iv. Ketodiastix
   b. IMPORTANT: Physician's order should specify type of procedure to use. Never change the procedure without informing the physician in that different procedures yield different

results.

3. Procedure for Clinitest
   a. Perform INITIAL STEPS.
   b. Instruct the resident to void into the specimen container just before you will be conducting the test. IMPORTANT: Use a fresh specimen. Use a second voided specimen (within 30 minutes) whenever possible.
   c. Place test tube upright in the test tube rack. IMPORTANT: DO NOT hold the test tube in your hand. The heat of the chemical reaction can cause burns.
   d. Draw five drops of urine from the specimen container with the medicine dropper. Drop the urine into the test tube.
   e. Rinse the dropper and add ten drops of clean water to the urine in the test tube.
   f. Without touching the tablet with your hands, drop one Clinitest tablet into the test tube. IMPORTANT: Drop the tablet directly from the container into the container cap and then into the test tube. Do NOT use a medication cup.
   g. After exactly 15 seconds, gently shake the test tube. IMPORTANT: Exact timing is important. Do not touch the test tube while the chemicals are boiling.
   h. Compare the color of the liquid in the test tube with the Clinitest color chart to determine test results.
   i. Clean equipment and return to designated area. Dispose of specimen container and rinse test tube with water.
   j. Perform FINAL STEPS.
4. Procedure for the Acetest
   a. Perform INITIAL STEPS.
   b. Instruct the resident to void into the specimen container just before you will be conducting the test. IMPORTANT: Use a fresh specimen. Use a second voided specimen (within 30 minutes) whenever possible.
   c. Without touching the tablet with your hands, put an Acetest tablet on dry, white paper. IMPORTANT: Drop the tablet directly from the container into the cap and then onto the paper.
   d. Draw urine from the specimen container using the medicine dropper. Drop one or two drops on the tablet.
   e. Wait for 30 seconds.
   f. Compare the color of the tablet with the Acetest color chart to determine test results.
   g. Perform FINAL STEPS.
5. TesTape
   a. Perform INITIAL STEPS.
   b. Instruct the resident to void into the specimen container just before you will be conducting the test. IMPORTANT: Use a second voided specimen (within 30 minutes) whenever possible.
   c. Tear off about one and one-half inches of TesTape from the dispenser.
   d. Dip the end of the TesTape into the urine for 2 seconds. Tap off excess urine.
   e. Wait exactly one minute. IMPORTANT: Exact timing is necessary for accurate results.
   f. Compare darkest color of the moistened tape with the color chart on the TesTape dispenser to determine test results.
   g. Perform FINAL STEPS.

6. Ketodiastix
   a. Perform INITIAL STEPS.
   b. Instruct the resident to void into the specimen container just before you will be conducting the test. IMPORTANT: Use a fresh specimen. Use a second voided specimen (within 30 minutes), whenever possible.
   c. Dip Ketodiastix into urine specimen and remove it immediately. Tap off excess urine. Hold the stick horizontal to prevent mixing the chemicals from the two areas.

d. Wait exactly 15 seconds. IMPORTANT: Exact timing is necessary for accurate results.
e. Compare the color of the ketone section with the color chart on the bottle to determine results.
f. After 30 seconds, compare the color of the glucose section with the color chart on the bottle to determine results. IMPORTANT: Exact timing is necessary for accurate results.
g. Perform FINAL STEPS.

II. Blood Glucose Testing

A. Introduction to Blood Glucose Monitoring

1. When a person has diabetes, the body is no longer able to produce insulin. Insulin is used to help move the energy from carbohydrates into the cells of the body for use. Diabetes can be managed through the use of diet, exercise, and sometimes by taking medication. Treatment for diabetes can either be through oral medication that helps the body make insulin, or through injections of insulin that take the place of the insulin that the body no longer manufactures.
2. Measurement of blood sugar helps determine if the medical treatments are effective. Blood sugars are often checked before a resident eats or takes prescribed medications. A normal blood sugar reading ranges between 60 – 120 mg.
3. Follow the physician's orders concerning frequency of obtaining blood sugar readings and report abnormal readings to the nurse immediately.
4. ***Hypoglycemia*** occurs when a person's blood sugar is too low. Hypoglycemia can occur very quickly when a resident has had too much medication or not enough to eat.

   Symptoms of hypoglycemia may include:
   a. shaking, sweating heavily
   b. weakness or fatigue
   c. pale, cold, clammy, skin
   d. anxiety or confusion
   e. grouchiness
   f. fast heartbeat
   g. headache
   h dizziness
   i. hunger
   j. blurred vision

   If a diabetic resident has symptoms of hypoglycemia, give the resident a glass of juice immediately, take a blood sugar reading, and notify the nurse immediately. The facility may have a protocol to follow for hypoglycemic episodes. Refer to facility policy.
5. Symptoms of ***hyperglycemia*** or high blood sugar include:
   a. extreme thirst
   b. frequent urination
   c. dry skin
   d. hunger
   e. blurred vision
   f. drowsiness
   g. nausea

B. Procedure—Finger Stick Blood Glucose Testing

1. Ask the resident's permission to measure the blood sugar.
2. Make certain the resident is comfortable when you perform the test.
3. Perform INITIAL STEPS.
4. Cleanse the chosen site with an alcohol wipe, and let the site dry.
   a. By allowing the site to dry, the procedure is less likely to sting when the skin is punctured with the lancet.
   b. The presence of alcohol can alter the test results on the test strip if mixed with the blood.
5. Collect your equipment:

a. the testing meter
b. test strip
c. lancet
d. gloves
e. sharps container

6. Wash your hands and put on gloves.
7. Turn on the testing meter.
8. Check the code on the meter and make certain that it matches the code on the test strip bottle.
   a. Change the code on the meter if necessary.
9. Ask the resident to relax his/her hand and dangle it downward to promote blood flow to the tips of the fingers.
   a. Massage the finger starting at the base of the finger, and moving to the tip of the finger.
   b. Exert some pressure on the fingertip by holding it between your thumb and index finger.
10. Perform the finger stick. Use the side of the fingertip, as it will hurt less and prevent the tip of the finger from becoming too sensitive.
    a. A regular lancet is used for the puncture if there is no spring loaded instrument or if the person has very tough skin.
    b. Hold the lancet between your thumb and index finger.
    c. Holding the person's finger firmly with your other thumb and forefinger, make a quick, firm, puncture; as you withdraw the lancet, twist it slightly.
    d. A spring loaded instrument can make the fingerstick quicker and easier. Following the manufacturer's instructions, insert the lancet into the device and set the spring. Press the button at the top of the pen.
11. Squeeze the finger gently to obtain a large drop of blood.
12. Apply the blood carefully to the pad on the end of the test strip. Many strips can only be touched once; the blood should not be smeared on the pad of the test strip.
13. Place the strip in the slot of the machine for reading.
14. Wait for the digital reading to appear.
15. Apply pressure to the resident's finger with a tissue.
16. Discard the lancet into the sharps container. Avoid sticking yourself with the used lancet.
17. Discard the test strip according to facility policy.
18. Perform FINAL STEPS.
19. Report abnormal readings that are above or below the parameters indicated on the resident's clinical record to the nurse.

C. Miscellaneous
   1. Many meters simply read "high" or "low" if the reading is above or below the highest or lowest number that can be read by the meter. If this occurs, the QMA must alert the licensed nurse immediately.
   2. There are several different brands/types of glucose meters available. The QMA must receive training for the specific device utilized by the facility of employment.

D. Control Testing
   1. Each blood glucose meter will have a test strip, solution or device to routinely confirm that the meter's readings are accurate. The QMA must review the manufacturer's instructions and receive quality control training for the specific device utilized by the facility of employment.
      a. Facility policy or manufacturer's instructions will dictate the frequency of control testing.

NOTES:
