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ACTION	*DATE*	*INITIAL*
Revised	1/9/11	MAS
Reviewed	1/5/15	MAS
Reviewed	2/8/16	KLW
Reviewed	12/12/16	KLW

Supersedes: 1/09 changed Bayer to Siemens
FBC Discontinued use 10/1/2015

TITLE: Urine Screening for Glucose/Protein/Ketones

PRINCIPLE: Performed by an RN/LPN/PCE **t**o accurately screen for the presence of glucose, protein and/or ketones in urine at the qualitative level. The **Protein** test is based on the protein-error-of indicators principle. At a constant pH, the development of any green color is due to the presence of protein. Colors range from yellow for "Negative" through yellow-green and green to green-blue for "Positive" reactions. The **Glucose** test is based on a double sequential enzyme reaction. One enzyme, glucose oxidase, catalyzes the formation of gluconic acid and hydrogen peroxide from the oxidation of glucose. A second enzyme, peroxidase, catalyzes the reaction of hydrogen peroxide with a potassium iodide chromogen to oxidize the chromogen to colors ranging from green to brown. The **Ketone** test is based on the nitroprusside reaction with acetoacetic acid and is based on the development of colors ranging from pink to maroon when acetoacetic acid reacts with nitroprusside. The presence of ketone bodies is important in the evaluation of carbohydrate metabolism.

POLICY: The RN/LPN/PCE will be knowledgeable of the procedure for screening the urine for protein and/or glucose and/or ketones. The nurse will be assessed for competence upon orientation and be reassessed annually. Annual reassessment will be done by trained education personnel utilizing this policy on Education Day and documented on their Education Day checklist. RN's, LPN's and PCE's are tested for color blindness upon hire to the PCW Care Center. Occupational Health will notify the unit if a nurse is colorblind.

SPECIMEN:

Collect urine in a clean container and test it as soon as possible. The use of urine preservatives is not recommended. If testing cannot be done within an hour after voiding, refrigerate the specimen immediately and let it return to room temperature before testing.

Prolonged exposure of unpreserved urine to room temperature may result in microbial proliferation with resultant changes in pH. A shift to alkaline pH may cause false positive results with the protein test area. Urine containing glucose may decrease in pH as organisms metabolize the glucose.

Contamination of the urine specimen with skin cleansers containing chlorhexidine may affect protein test results.

EQUIPMENT AND SUPPLIES:

1. Clean dry urine container
2. Siemens Uristix Reagent strips or Ketostix Reagent strips.
3. Gloves

PROCEDURE:

1. Identify patient with two identifiers. State patient name and check medical record number.

2. Teaching - Instruct patient about test and implications of test results.

3. Implementation

Uristix/Ketostix:

A. Collect clean fresh urine specimen in a clean, dry container. Urine should be tested within one hour of collection. Do not touch the test area of the strip.

B. Remove one strip from bottle and replace cap immediately. Immerse reagent areas of the strip in urine and remove immediately to avoid dissolving out reagents.

C. Remove excess urine from test strip by running the edge of the strip against the rim of the urine container. Hold the strip horizontal to avoid possible mixing of chemicals from adjacent reagent areas.

D. Compare reagent areas to corresponding color chart on the bottle label at the time specified. Hold strip close to color blocks and match carefully. Avoid laying the strip directly on the color chart, as this will result in the urine soiling the chart.

Proper read time is critical for optimal results. **Protein** may be read immediately and any time up to two minutes after dipping. Read the **glucose** at 30 seconds. Read **ketones** result at 15 seconds**.** All may be read between 1 and 2 minutes for identifying negative specimens. Color changes occurring after two minutes have no diagnostic value.

DOCUMENTATION:

Document test results in Epic. Inform physician of abnormal results. Uristik results will be reported as negative tr, 1+, 2+, 3+. Ketostix results are read as negative or varying degrees of positive - trace, small (1+), moderate (2+) or large (3+).

QUALITY CONTROL:

1. Each new bottle will be labeled with date opened and tested with known positive and negative controls. This function will be a testing personnel responsibility. Strips will be stored in Lab and ordered from Lab when needed.
2. The bottle lid will be closed tightly immediately after removal of a test strip.
3. Store the Uristix Reagent strips and Ketostix Reagent strips at room temperature between 59-86° (15°-30° C). Do not store the bottle in direct sunlight. Do not use product after expiration date.
4. Ketostix Reagent strips may be used for ***six months after being first opened***.
5. All unused strips must remain in the original bottle. Do not remove desiccant from bottle.
6. Protection against ambient moisture, light and heat is essential to guard against altered reagent reactivity

LIMITATIONS:

As with all laboratory tests, definitive diagnostic or therapeutic decisions should not be based on any single result or method. Substances that cause abnormal urine color, such as drugs, containing azo dyes (Pyridium, Azo Gantrisin, Azo gantanol, nitrofurantoin (Macrodantin, Furadantin), and riboflavin, may affect the readability of the reagent strip. The color development on the reagent pad may be masked, or a color reaction may be produced on the pad that could be interpreted as a false positive.

Protein: False positive results may be obtained with highly buffered or alkaline urines. Contamination of the urine with quaternary ammonium compounds from some antiseptics and detergents or with skin cleansers containing chlorhexidine may also produce false positive results.

Glucose: Ascorbic acid concentrations of 50 mg./dl or greater may cause false negatives for specimens containing small amounts of glucose (75-125 mg/dl). Ketone bodies reduce the sensitivity of the test. Moderately high Ketone levels (40 mg/dl) may cause false negatives for urine containing small amounts of glucose but the combination of such Ketone levels and glucose levels is metabolically improbable in screening. The reactivity of the glucose test decreases as the specific gravity of the urine increases. Reactivity may also vary with temperature.

Ketones: Improper handling of the product to allow moisture absorption will adversely affect results. False positive results (Trace or less) may occur with highly pigmented urine specimens or those containing large amounts of levodopa metabolites. Compounds such as mesna (2-mercaptoethane sulfonic acid) that contain sulfhydryl groups may cause false positive results or an atypical color reaction.

REFERENCES:

Package insert for Uristix, Siemens Corporation
Package insert for Ketostix, Siemens Corporation