Review

Appropriate Laboratory Testing

Urine Specific Gravity and Refractometer

Humboldt State University, Student Health Center

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PURPOSE: To review current practice of confirming all dipstick urinalysis specific gravity's ≥ 1.030 with a refractometer.

The urine dipstick test is a **screening test** for a variety of metabolic disease processes. Normal specific gravity ranges from 1.001 – 1.035. A specific gravity of >1.023 in a random urine sample serves as good evidence that the concentrating ability is preserved. Kidneys lose concentration abilities in disease states such as diabetes insipidus where the urine has a fixed value of 1.010.

Specific gravity is reported by dipstick method in increments of .005 from 1.000 to 1.030. The manufacturer states, "in general that the dipstick correlates within 0.005 with values obtained with the refractive index method." Falsely elevated results may occur in the presence of moderate quantities of protein. The specific gravity dipstick test is not affected by the presence of radiopaque dyes as is the refractometer.

PERFORMANCE GOAL:

To provide accurate timely results in a cost effective manner without duplicating our work effort.

DESCRIPTION OF DATA:

The Clinitek Status analyzer printouts were reviewed, from the past semester, for all specific gravities ≥ 1.030. Written on the instrument tapes are the refractometer values for these samples. The refractometer results are reported as the urine specific gravity as per laboratory policy.

DATA ANALYSIS & INTERPRETATION:

During the period from August, 2016 through December 2016, there were thirty five recorded specific gravity's ≥ 1.030. Eighteen refractometer results (51%) ranged from 1.025 through 1.030 correlating with the .005 that the manufacturer claims. Another fifteen refractometer results (43%) ranged from 1.021 -1.024 compared to the dipstick report of ≥1.030. Ten of these samples had blood or protein positive results. Two refractometer results were reported < 1.020 (6%). One at 1.016 (2+ blood and protein) and one at 1.006 (no obvious interfering substances).

Number Tested	Reported Refractometer	Reported Dipstick
18	1.025-1.030	≥1.030
15	1.021-1.024	≥1.030
2	1.006, 1.016	≥1.030

CLIA requires a function check of the refractometer and two levels of control run each day of use. Each day that a dipstick specific gravity exceeds 1.030 we must bring two levels of control to room temperature (about 15 minutes) before performing quality control testing. This delays release of the dipstick result by 20-30 minutes, depending on how busy the lab is at that particular moment. Recently our clinic implemented a policy of ordering only a dipstick UA on patients presenting with uncomplicated urinary tract symptoms. The purpose was to expedite laboratory test results to improve

patient flow through the clinic. Delaying UA results to confirm a specific gravity is counterproductive to our goal of expediting lab results.

Our laboratory recently underwent a biennial survey. The surveyor was surprised to see that our UA policy still included the confirmation of dipstick results for specific gravity. He only sees about two laboratories a year that use the refractometer.

The confirmatory testing was historically performed to confirm results obtained from the urine dipstick. But this practice has been discontinued as the ability for more specific testing for disease processes has become the norm, making the screening test less diagnostic. Clinical and Laboratory Standards Institute (CLSI), a national organization that makes recommendations for best practice laboratory standards, states that "many of the historical confirmatory urinalysis tests may not be relevant to current laboratory practice." Laboratory accrediting agencies, such as the College of American Pathologists (CAP) and COLA, do not require these confirmations and suggest that users follow the manufacturer's recommendations. The manufacturer makes no recommendations to confirm specific gravity dipstick results.

IMPLEMENTATION:

Based on a review of our data and the literature, I recommend we discontinue confirming specific gravity dipstick results ≥ 1.030. The urine dipstick is a screening test that can be completed in a matter of minutes at minimal expense with appropriate patient results. The timely results and reduced duplication of technologist testing services benefit the clinic and the patient. More accurate urine testing is available if the physician wants to pursue diagnosing metabolic diseases of the kidney.

REFERENCES:

Siemens Multistix 10 SG package insert. June, 2010

Clinical and Laboratory Standards Institute: Urinalysis: Approved Guideline-Third Edition. Wayne, PA, 2009. CLSI document GP16-A3

_____Date: _____ _____Date: _____

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Method Comparison Worksheet

Date: February, 2017

Analyste: Urine Specific Gravity

Primary Method: Siemens Multistick Secondary Method: Refractometer

Sample #	Result Urine Dipstick	Result Refractometer	Within Manufacturers Expected Value of 0.005
44191	≥1.030	1.029	Yes
43955	≥1.030	1.021	No
44137	≥1.030	1.021	No
43412	≥1.030	1.023	No
43413	≥1.030	1.026	Yes
43213	≥1.030	1.023	No
42377	≥1.030	1.026	Yes
42300	≥1.030	1.030	Yes
43565	≥1.030	1.024	No
42649	≥1.030	1.025	Yes
43652	≥1.030	1.026	Yes
42455	≥1.030	1.006	No
42774	≥1.030	1.024	No
42744	≥1.030	1.028	Yes
42922	≥1.030	1.024	No
42937	≥1.030	1.028	Yes
41206	≥1.030	1.024	No
41168	≥1.030	1.027	Yes
41904	≥1.030	1.024	No
41779	≥1.030	1.023	No
41790	≥1.030	1.027	Yes

41748	≥1.030	1.024	No
41664	≥1.030	1.022	No
41650	≥1.030	1.023	No
41648	≥1.030	1.023	No
Sample #	Result Urine Dipstick	Result Refractometer	Within Manufacturers Expected Value of 0.005
41587	≥1.030	1.026	Yes
42158	≥1.030	1.029	Yes
41109	≥1.030	1.025	Yes
42135	≥1.030	1.027	Yes
42123	≥1.030	1.025	Yes
41039	≥1.030	1.028	Yes
42101	≥1.030	1.016	No
40972	≥1.030	1.029	Yes
41990	≥1.030	1.023	No
40513	≥1.030	1.026	Yes