

Urinalysis

Introduction

Urinalysis is the examination of urine in order to determine the health status of a patient. Physical components, such as color, clarity, pH, specific gravity, turbidity, and the volume of output, as well as chemical components, such as urea, phosphates, nitrates, nitrites, sulfates, hemoglobin, red and white blood cells, glucose and lipids, are measured and compared against known standard ranges to determine possible conditions or diseases of a patient. While many factors may affect the results of urinalysis, combined with patient history, physical examination, and other laboratory tests, urinalysis is an excellent indicator of patient etiologies.

Materials and Methods

Gloves were donned prior to testing urine samples. Multistix 10 SG Reagent Strips for Urinalysis by Siemens were used to test two patient samples of urine and compared to a control sample of urine. Care was taken not to touch the test pads on the reagent strips. Test strips were fully dipped into the samples and then drawn across the edge of the container to remove excess urine. Each strip was then compared to the corresponding color blocks for the associated test.

Results

Patient 1 urine sample was positive for leukocytes, nitrite, protein, ketone, bilirubin, and glucose. The sample for Patient 1 was also slightly cloudy. Urobilinogen, pH, blood, and specific gravity were all negative or within normal limits.

Patient 2 urine sample was positive for protein, blood, and glucose. Specific gravity was on the lower end of normal and pH was at the upper limit of normal. The sample for Patient 2 was clear. Leukocytes, nitrite urobilinogen, ketone, and bilirubin were all within normal limits.

The specific values for each patient as well as values for the control sample are listed in Table 1 below.

	Patient 1	Patient 2	Control
Leukocytes	trace	negative	negative
Nitrite	positive	negative	negative
Urobilinogen	0.2	0.2	0.2
Protein	2000+	2000+	negative
pH	6.0	8.0	6.0
Blood	negative	large	negative
Specific Gravity	1.030	1.005	1.030
Ketone mg/dL	trace	negative	negative
Bilirubin	small	negative	negative
Glucose g/dL (%) mg/dL	2+ 2000+	1 1000	negative

Table 1: Urine test strip results for Patients 1 & 2 and Control values

Discussion and Conclusion

The test strip for Patient 1 was positive for nitrite and a trace amount of leukocytes, indicating a possible UTI. Trace amounts of ketone and a significant amount of glucose were present, indicating a possible new onset of diabetes or pre-existing diabetes that is not well controlled, although glucosuria can sometimes be a result of kidney damage or disease. Protein was 2000+, which can sometimes be a side effect of a UTI; however, this should be monitored for possible kidney problems secondary to diabetes. There was a small amount of bilirubin present typically indicating problems associated with the liver; however, considering the other findings and that the amount of bilirubin present was small, this may be an indication infection or dehydration. The urine sample for Patient 1 was slightly cloudy, which can also be an indicator of a UTI, diabetes, and/or dehydration. Urobilinogen, pH, and specific gravity were within normal limits, and the urine sample was negative for blood. Due to the tests being conducted elsewhere with only the result strips being provided, odor of the urine could not be determined.

Based on the urinalysis for Patient 1 it is suspected that this patient has uncontrolled diabetes and a urinary tract infection. Risk for a UTI increases with diabetes. With a full patient history and further laboratory testing a more definitive diagnosis can be made.

The test strip for Patient 2 was positive for protein, blood, and glucose. Specific gravity was on the lower end of normal indicating dilute urine and pH was at the upper limit indicating a more basic urine sample. The sample for Patient 2 was clear. Based on the urine being more basic, the presence of blood, and proteinuria, it is likely Patient 2 has renal calculi. The lower specific gravity can be from excessive fluid intake, which could be due to the patient trying to assist a possible stone in passing, or it could be a falsely low measure due to the higher alkalinity of the urine. Glomerulonephritis is not suspected due to the normal color of the urine

sample. However, considering the urine sample was positive for glucose, it would be important to follow up with this patient regarding diabetes if no renal failure is suspected.

References

Fundamentals of Anatomy & Physiology, 11th ed., 2018, by F. Martini; Pearson Education, Inc.

Human Anatomy & Physiology Laboratory Manual (Fetal Pig), 13th ed., 2019, by E. Marieb, Pearson Education, Inc.

[Innovative Urinalysis Test Strips with ID bands](https://www.siemens-healthineers.com/en-us/point-of-care-testing/featured-topics-in-poc/urinalysis-featured-topics/innovative-urinalysis-test-strips-id-bands)

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