FPIN's Clinical Inquiries

Urine Dipstick for Diagnosing Urinary Tract Infection

Clinical Question

How accurate is the urine dipstick for diagnosing urinary tract infection?

Evidence-Based Answer

The sensitivity and specificity of the urine dipstick varies somewhat with the setting and population, as does its recommended interpretation. Women with classic urinary tract infection (UTI) symptoms have a high pretest probability of infection, and use of the dipstick adds little to the diagnosis. In women with nonspecific urogenital symptoms, positive or negative dipstick results may require a backup urine culture depending on the clinical situation. In low-risk patients with a low pretest probability of UTI, the urine dipstick alone is useful to exclude infection if both nitrites and leukocyte esterase are negative. [Strength of recommendations: C, all recommendations based on meta-analyses of cohort studies not addressing patient-oriented outcomes]

Evidence Summary

A systematic review[1] summarized the evidence on the diagnostic accuracy of the urine dipstick test for urinary tract infection, comparing test performance in various practice settings including outpatient primary care, emergency department, and inpatient care. Test performance also was estimated in the general population, including but not limited to children, pregnant women, older patients, and urology patients.[1] Sensitivity using nitrites and/or leukocyte esterase was highest in the outpatient primary care setting (90 percent) and lowest in pregnant women (68 percent). Specificity was lowest in the outpatient primary care setting (65 percent). Table 1 [1,2] discusses the performance of the urine dipstick test for diagnosing UTI in selected populations.

TABLE 1

Performance of Urine Dipstick Test for Urinary Tract Infection in Selected Populations

	Pretest likelihood of UTI (%)	Sensitivity (%)	Specificity (%)	Probability of UTI with positive test* (%)	Probability of UTI with negative test† (%)
Pregnancy (asymptomatic)1	6	68	87	58	5
Children (symptomatic)1	20	83	85	58	5
Elderly (symptomatic)1	30	82	71	55	10
Unselected primary care patients (symptomatic)1	55	90	65	76	16
Women (symptomatic, without vaginal complaints)1,2	90	75	82	81	23

UTI = urinary tract infection.

*-Positive test defined as positive leukocyte esterase, positive nitrites, or both.

†-Negative test defined as leukocyte esterase and nitrites negative.

Information from references 1 and 2.

The clinical utility of the dipstick depends on the pretest probability of a UTI. In general, a negative test in a patient with a low pretest probability based on clinical presentation rules out disease, whereas it may not for a patient with a higher pretest probability. Conversely, a positive test may adequately confirm disease for a patient with classic symptoms of UTI and a high pretest probability, but not for a patient with a more confusing clinical picture and a lower pretest probability.

One systematic review2 reported that the pretest probability of UTI in otherwise healthy women with classic UTI symptoms (e.g., dysuria and frequency) is 60 percent. In women with classic symptoms who do not have any vaginal discharge or irritation, the pretest probability of UTI increases to 90 percent.2 Patients presenting with at least one poorly defined symptom (such as vaginal complaints) had a pretest probability of UTI of 50 percent. In this setting, a positive dipstick increased the probability of a UTI to 81 percent whereas a negative dipstick reduced the probability to 23 percent.2

Urinary complaints in children are commonly caused by noninfectious problems. Two meta-analyses[1,3] found that the pretest probability of UTI in children was between 5 and 20 percent. A completely negative dipstick reduces the probability of a UTI to 5 percent in this setting, whereas a positive leukocyte esterase or nitrite increases the probability to only 58 percent.[1] These patients therefore require further diagnostic confirmation (e.g., with a urine culture). A second meta-analysis[4] of diagnosis in children suggests that a dipstick testing positive for both nitrite and leukocyte esterase provides strong evidence in favor of UTI (likelihood ratio = 28.2). This study also confirms the usefulness in ruling out disease with a dipstick negative for both nitrites and leukocyte esterase.[4]

Recommendations from Others

Evidence-based guidelines from the University of Michigan[5] and the Institute for Clinical Systems Improvement[6] support the approach of managing suspected UTI by telephone in women with typical symptoms of UTI, no vaginal symptoms, and no major comorbidities. A guideline from the Cincinnati Children's Hospital Medical Center[7] recommends a backup urine culture in children with suspected UTI, even if the dipstick or urine microscopy is negative.

Clinical Commentary

In women with classic UTI symptoms, particularly in the absence of vaginal symptoms, the probability of a UTI is so high that empiric treatment may be considered without dipstick testing. This might allow treatment by telephone, without necessitating a patient visit resulting in improved cost savings and patient convenience. In a patient with nonspecific complaints such as dysuria and vaginal discharge, a dipstick might be useful. In low-risk patients with a low pretest probability of UTI, the dipstick adequately rules out infection when both leukocyte esterase and nitrites are negative. This also has the benefit of cost containment because fewer urine cultures are needed in low-risk patients. Given the more serious consequences of a missed diagnosis of UTI in children, a backup urine culture is recommended.

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