

Title: Urine dipstick parameters as predictors of positive urine culture in second and third trimester pregnant patients

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Background: Urinary tract infections are a common cause of morbidity and mortality during pregnancy, and thus are screened for during routine obstetrics visits. Many patients also present to the emergency department with complaints of abdominal pain or preterm labor, and a urine sample is often collected in the workup. The gold standard to diagnose urinary tract infection or asymptomatic bacteriuria is a urine culture, however this is an expensive test and takes 24-48 hours for results to return. Instead, many practices use point of care testing, a urine dipstick, to screen for urinary infections. However, there is not a standard set of guidelines to determine what is considered a "positive" dipstick. Often, patients may be treated for presumed asymptomatic bacteriuria based on the urine dipstick results, even when no bacterial growth or mixed normal flora is identified on urine culture. This leads to situations where patients may be treated with antibiotics unnecessarily, which may contribute to antibiotic resistance.

Objective: To establish a continuum of urine dipstick parameters with increasing combinations of sensitivity and specificity that correlate with positive urine culture in order to identify a threshold for recommending empiric treatment with antibiotics.

Method: This was a cross-sectional chart review of pregnant women in their second and third trimesters who presented to the obstetric emergency department (OBED) and had a urine dipstick and urine culture collected. We evaluated the following urine parameters: leukocyte esterase, nitrites, protein and blood. Urine culture was defined as positive if there were >100,000 units of a single organism present. We incorporated patient blood pressure elevation in our model, considering its potential to affect urine protein. The data was analyzed using Wilcoxon-Mann-Whitney tests, Pearson's Chi Squared tests, and Fisher's exact tests. Logistic regressions were used to investigate the different combinations of urine dipstick parameters that correlated with positive urine culture.

Results: Of 130 patients with both urine dipstick and urine cultures completed, 32 had a positive urine culture and 98 had urine culture with either no growth or mixed flora. Younger gestational age, positive nitrites, and non-negative blood were significantly associated with positive urine culture ($p < 0.05$). The best combination of predictors was patient age, gestational age, nitrites and blood, which yielded an area under the curve (AUC) of 0.9.

Conclusions: The best urine dipstick parameters that correlated with positive urine culture were positive nitrites and non-negative blood. Leukocytes and protein did not have a significant association with positive urine culture. When determining whether or not to provide a patient with antibiotics based off of a urine dipstick, nitrites and blood should serve as the most reliable predictors of positive urine culture. However, clinical judgment should always be used while keeping principles of antibiotic stewardship in mind.