

## ***An Evaluation of Reflex Urine Culture Criteria for Emergency Department Patients***

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**Research Type:** Research Abstract

**IRB Approval or Exemption:** FWA00000176

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*Official submission to the FCEP Emergency Medicine Research Competition at Symposium by the Sea 2022*

## An Evaluation of Reflex Urine Culture Criteria for Emergency Department Patients

**Study Objectives:** Emergency physicians frequently order a urinalysis with a “reflex” urine culture meaning that a urine culture is performed if the urinalysis is abnormal. However, it is uncertain what criteria on a urinalysis make it sufficiently abnormal to warrant a reflex urine culture. We thus performed a retrospective analysis to determine which criteria provide the best test characteristics for predicting a positive urine culture.

**Methods:** We performed a retrospective chart review using a sample of 500 patients who had more than 10 leukocytes detected on urinalysis. Data came from emergency department (ED) patients who visited our hospital in 2020. We excluded patients who did not have a urine culture performed. For each included patient, we recorded patient demographics, symptoms, urinalysis results, and urine culture results. Our laboratory uses the following categories for urinalysis results: leukocytes (trace, small, moderate, or large); nitrites (positive or negative); microscopic white blood cells (<10, 10-14, 15-19, 20-24, 25-29, 30-34, 35-49, 50-99, 100+), and bacteria (none, 1+, 2+, 3+, or 4+). We calculated the sensitivity and specificity (with 95% CIs) for various abnormal findings on urinalysis for predicting a positive urine culture.

**Results:** Of the 500 urinalysis samples, 460 had a urine culture performed and were included for analysis. In this sample, the median age was 36 (IQR: 27-47.3), and 76.3% were female. In total, 97 (21.1%) had no documented symptoms of a urinary tract infection (UTI). Urine cultures were positive in 215 patients (46.7%) with the most common organism being *E. coli* (56.3%) and the 2<sup>nd</sup> most common being *klebsiella pneumoniae* (7.0%). Using at least small leukocytes as a cutoff resulted in a sensitivity of 89.8% (95% CI 84.9-93.5) and a specificity of 25.3% (95% CI 20.0-31.2). For positive nitrites, the sensitivity was 26.1% (95% CI 20.3-32.5), and the specificity was 94.7% (95% CI 91.1-97.1). For either small leukocytes or positive nitrites, the sensitivity was 91.2% (95% CI 86.5-94.6), and the specificity was 23.7% (95% CI 18.5-29.5). For at least 15 white blood cells on microscopic analysis or at least 3+ bacteria, the sensitivity was 91.6% (95% CI 87.1-95.0), and the specificity was 22.0% (95% CI 17.0-27.8). For the combined cutoff of at least small leukocytes, positive nitrites, at least 15 white blood cells, or at least 3+ bacteria, the sensitivity was 95.4% (95% CI 91.6-97.8), and the specificity was 8.2% (95% CI 5.1-12.3)

**Conclusions:** Individually, either a dipstick urine evaluation or a microscopic urinalysis generated a sensitivity of around 90% for positive urine cultures. When combining dipstick and microscopic analyses the sensitivity increased to 95% but with a very low specificity (8%). Since over a fifth of patients had no documented symptoms of a UTI, a more targeted approach to the use of urine cultures incorporating pretest probability of a UTI may be warranted.