URINALYSIS TO DIAGNOSE UTI

TITLE: Urinalysis predictive of urine culture results
AUTHOR: Bailey BL Jr
JOURNAL: *The Journal of Family Practice*
DATE: January 1995; Volume 40:45–50.

Clinical question. Which urinalysis findings indicate a urinary tract infection as defined by a positive culture?

Background. Urinary tract infection (UTI) is a common acute medical condition, responsible for nearly 7 million physician office visits annually and accounting for nearly $1 billion in ambulatory medical care costs.[1,2] This infection is commonly diagnosed in the office setting by dipstick and urinary microscopy. Surprisingly, one unresolved question is how best to interpret a urinalysis. For example, how many white blood cells per high power field (WBC/hpf) indicate the presence of infection? A review of the medical literature contains great variation among suggested cutoff point values ranging from a value ≥2 WBC/hpf to a value ≥15 WBC/hpf.[3–6]

Population studied. This study is based on 202 consecutive urine samples collected from patients seen at a family practice training site over a 10-month period, on which a physician ordered both urinalysis and culture. Urine samples were collected for three reasons: (1) the patient had signs or symptoms of infection, (2) the physician suspected infection, or (3) the physician wanted to confirm resolution of infection. While both adult and pediatric patients were sampled, 82% of the samples were from women, and the mean age of the patients was 49.5 years.

Study design. This is a retrospective review of a consecutive series of urine samples that concurrently underwent in-office urinalysis and out-of-office culture. The retrospective nature of this study renders the findings subject to several sources of possible bias: variability in physicians' criteria for ordering the tests, variability in the technique of urinalysis, variabilty in how the urine for culture was processed, and the reliability of data extraction from patient charts.

In evaluating the validity of the study, we should focus on the external validity or generalizability: are the patients studied representative of those typically seen for evaluation of dysuria? This is important because tests perform differently in groups with different severities of illness (it is "easier" for a test to distinguish between healthy and severely ill patients than between healthy and slightly ill patients).[7] In this case, we do not know the percentage of patients suspected to have UTI who had both urinalysis and culture. For example, the urine samples used for this study might represent a highly selected group of patients if physicians ordered cultures only for patients with the most severe symptoms. The patients in this study may be different from patients evaluated for possible UTI in your office.

In a study focusing on a diagnostic test, it is also important to consider the reference standard used to define disease. For this study, UTI was defined as 50,000 CFU/mL of one or two organisms, based on a culture performed at an outside commercial reference laboratory. This standard would misclassify patients who have a UTI but who have lower counts of bacteria. Because test sensitivity is calculated by observing how the test performs in diseased patients, misclassification of diseased patients to the nondiseased category will affect the sensitivity that we observe. We are told by the author that reanalysis with colony counts of 10,000 and 100,000 produced similar results.

Results. The author uses receiver-operating curve (ROC) analysis to graphically show the relationship between sensitivity and specificity for different cutoff points of bacteriuria and pyuria. He uses these curves to identify the cutoff points that provide the best balance between sensitivity and specificity, and concludes that bacteriuria ≥2+, ≥10 WBC/hpf, or a positive dipstick test for nitrites should be considered a positive test indicative of infection. He also investigates how these tests can be combined, empirically concluding that any two positive findings with respect to three criteria (2+ bacteriuria, 15 WBC/hpf, or nitrite positive) are better than any single test at distinguishing between infected and noninfected patients.

Submitted, revised, April 18, 1995.

Dr Bergus is from the Department of Family Practice, University of Iowa, Iowa City. Address correspondence to George R. Bergus, MD, Department of Family Practice, University of Iowa, 2146 Steindler Bldg, Iowa City, IA 52242. e-mail: georgebergus@uiowa.edu

Drs Slawson and Coates are from the Department of Family Medicine, University of Virginia Health Sciences Center, Charlottesville. Address correspondence to David C. Slawson, MD, Department of Family Medicine, University of Virginia Health Sciences Center, Box 414, Charlottesville, VA 22908.

 ISSN 0094-3509

Recommendations for clinical practice. This study shows how complex this "simple" question is and why it remains incompletely answered. If it were clear that the patients chosen for this study were similar to those on whom you order a urinalysis to evaluate for infection, then the diagnostic guidelines would probably be appropriate to follow.

George R. Bergus, MD
Iowa City, Iowa

References

1. Stamm WE, Hooton TM. Management of urinary tract infections in adults. N Engl J Med 1993; 329:1328–34.
2. Johnson JR, Stamm WE. Urinary tract infections in women: diagnosis and treatment. Ann Intern Med 1989; 111:906–17.
3. Bergus GR. When is a test positive? The use of decision analysis to optimize test interpretation. Fam Med 1993; 25:656–60.
4. Spital A, Bodison S. Uncomplicated cystitis: diagnosis and treatment at college health centers. South Med J 1992; 85:692–5.
5. Patton JP, Nash DB, Abrutyn EA. Urinary tract infection: economic considerations. Med Clin North Am 1991; 75:495–513.
6. Ferry S, Andersson S, Burman LG, et al. Optimized urinary microscopy for assessment of bacteriuria in primary care. J Fam Pract 1990; 31:153–61.
7. Lachs MS, Nachmkin I, Edelstein PH, Goldman J, Feinstein AR, Schwartz JS. Spectrum bias in the evaluation of diagnostic tests: lessons from the rapid dipstick test for urinary tract infection. Ann Intern Med 1992; 117:135–40.

EFFICACY OF SCREENING MAMMOGRAPHY

TITLE: Efficacy of screening mammography: a meta-analysis
AUTHORS: Kerlikowske K, Grady D, Rubin SM, Sandrock C, Ernster VL.
JOURNAL: *JAMA*
DATE: January 1995; Volume 273:149–54

Clinical question. How effective is screening mammography at reducing mortality from breast cancer?

Background. In clinical trials, screening mammography has been shown to reduce mortality from breast cancer among women aged 50 years and older. It is unclear whether women aged 40 to 49 years also receive the benefit of reduced mortality from screening mammography. Individual studies have included too few women to detect a statistically significant difference in this age group.

Population studied. Women betweem 35 and 74 years of age were the subjects of the literature reviewed. A comprehensive literature search of English-language studies conducted from January 1966 to October 31, 1993, was performed using the MEDLINE database. Further published and unpublished articles were identified by a manual literature search of reference lists and from consultation with experts.

Study design and validity. A meta-analysis is a rigorous type of review article that combines the results from a number of studies in a statistically valid way. It is especially useful in the event that studies have conflicting results or inadequate sample size, which is the case for mammography among women aged 40 to 49. Also, because results are included for a variety of populations, the findings may be more generalizable than those obtained from a single group of patients.

Studies were included in this meta-analysis if they met the following criteria: (1) randomized controlled trial, prospective cohort with internal controls, or case-control with population-based controls, all with the main outcome of breast cancer death; (2) follow-up of at least 5 years and a minimum of 10 breast cancer deaths; (3) appropriate statistical evaluation of the risk of breast cancer mortality; and (4) risk calculation adjusted for age or based on controls that were age-matched to cases. Thirteen studies met these criteria; an updated analysis of one unpublished trial also was included. Two authors abstracted data from each article, and any disagreements between the two were settled by a third author. The authors were not blinded to the journal, year of publication, or authors, and did not state whether the original studies were assessed individually for validity with appropriate criteria. As a group, results of the original studies were homogeneous, ie, the findings were consistent from study to study. The latter is important because it supports the validity of the meta-analysis.

Outcomes measured. The primary outcome was a summary relative-risk estimate for the effect of screening mammography on breast cancer mortality. Secondary outcomes included "subgroup" analyses by patient age, number of mammographic views, screening interval, duration of follow-up, duration of screening, whether clinical breast examination was included, and the date the study began. The number of subgroup analyses is of some concern, as it increases the chances for a spurious outcome.

Results. The summary relative-risk estimate for breast cancer death among woman aged 50 to 74 years who underwent screening mammography compared with those who did not was 0.74 (95% confidence interval, 0.66 to 0.83).