

PRACTICE FORUM

Assessment of urine collection technique for microbial culture

Dana Prandoni, RNC, MSN
Mary Helen Boone, MT(ASCP)
Elaine Larson, RN, PhD, CIC
Cheryl G. Blane, RN, CIC
Helen Fitzpatrick, MT(ASCP)
Washington, D.C.

Two methods of urine collection—clean catch and midstream only—were compared in 200 samples (100 with each technique). There were no significant differences between the two collection methods with regard to number of positive culture results or types and counts of organisms isolated. There is little if any added benefit to special preparation for urine collection for culture. (AJIC Am J Infect Control 1996;24:219-21)

The Surgical Service Practice Council at our 400-bed tertiary care university teaching hospital is charged with the ongoing assessment and improvement of the quality and efficiency of patient care practices. One practice identified as needing scrutiny was the method for obtaining urine specimens for culture from women. Two components of the method include the careful cleansing around the urethral meatus with an antiseptic solution (referred to here as a "clean-catch" specimen procedure) and the collection of the urine sample midstream during urination (called "midstream specimen"). Obtaining a clean-catch specimen is time-consuming, adds to the cost of the specimen, and most importantly is extremely difficult to accomplish in a standard fashion. Nevertheless, a clean-catch midstream specimen continues to be a standard for obtaining urine specimens from women who are not catheterized. Because three previous studies over the past 16 years have demonstrated that there is probably little difference in results obtained from urine cultures obtained by use of various techniques,¹⁻³ we changed the procedure and conducted this follow-up study to determine whether there were differences in results of urine cultures

obtained from women by use of either clean-catch midstream specimens or midstream specimens with no cleansing.

METHODS

The study was conducted at an academic health care center in the mid-Atlantic region. Because the study was designed as a quality monitor of an approved change in protocol (from clean-catch to midstream only), the human subjects review committee advised that individual informed consent was unnecessary. Urine samples were consecutively collected from ambulatory inpatient and outpatient women ages 18 years and older over a period of approximately 2 weeks. Approximately the first 100 samples were collected after women were instructed to obtain clean catch, midstream specimens with a commercial kit containing a single-use antiseptic towelette containing benzalkonium chloride and a sterile specimen container. Then the procedure for midstream-only specimens was implemented, and staff were oriented to the new procedure. Two weeks after implementation of the midstream-only procedure, an additional approximately 100 specimens were analyzed. Specimens were transported to the laboratory within 2 hours of collection or were refrigerated. The study was conducted in February and March 1995.

Laboratory techniques. Specimens were streaked onto sheep blood agar and MacConkey Agar (BBL, Cockeysville, Md.) plates in the hospital's clinical microbiology laboratory by use of a 1 μ l calibrated disposable loop for quantitation

From Georgetown University Medical Center, Washington.

Reprint requests: Elaine Larson, RN, PhD, CIC, Georgetown University School of Nursing, 3700 Reservoir Rd., N.W., Washington, DC 20007-1069.

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Table 1. Types and counts of organisms isolated from clean catch, midstream and midstream only urine specimens

	Clean catch (149 isolates from 105 cultures)	Midstream only (199 isolates from 118 cultures)
Type of organism		
Skin flora (<i>Staphylococcus</i> sp., <i>Corynebacterium</i> sp., alpha streptococci)	55.8%	57.8%
Lactobacillus	22.8%	16.6%
<i>E. coli</i>	10.1%	11.6%
Other coliforms (<i>Klebsiella</i> sp., <i>Proteus</i> sp., <i>Pseudomonas</i> sp., <i>Serratia</i> sp., <i>Enterobacter</i> sp., etc.)	8.7%	8.0%
Yeast	1.3%	3.0%
Beta streptococcus, group B	1.3%	3.0%
Number of CFU		
< 5000	20.8%	26.0%
5000-10,000	21.5%	24.1%
11,000-49,000	35.6%	30.1%
50,000-99,000	10.7%	9.5%
100,000+	11.4%	10.5%

Chi square = 2.92; $p = 0.57$.

and standard laboratory protocol.⁴ Cultures were incubated at 35° C in 5% to 10% CO₂ for 18 to 24 hours before initial evaluation and finally were evaluated at 36 to 48 hours. Isolates were identified by use of standard protocols for the laboratory, which included Gram staining and biochemical testing.

Data analysis. Numbers of colony-forming units (CFU) were recorded in five categories: < 5000; 5000 to 10,000; 11,000 to 49,000; 50,000 to 99,000; and 100,000 or more. The chi square test was used to compare rates of no growth on cultures and numbers of CFU between the clean catch and the midstream-only specimens.

RESULTS

A total of 223 samples were obtained: 105 that were obtained by use of the clean catch protocol and 118 that were obtained by use of the midstream only procedure. Of those, 30.4% ($n = 32$) and 24.6% ($n = 29$), respectively, had no growth on culture (chi square = 0.5; $p = 0.50$). Types of organisms isolated were primarily skin flora (*Staphylococcus* sp., *Corynebacterium* spp., alpha streptococci), lactobacillus, *Escherichia coli*, and other coliforms (*Klebsiella* spp., *Pseudomonas* spp., *Proteus* spp., *Enterobacter* spp., enterococci, and *Gardnerella vaginalis*). Yeast and beta streptococci, group B, were found occasionally (Table 1).

Thirty-eight women cultured (17.0%) had CFU counts greater than 100,000/ml: 17 (16.2%) in the

clean-catch group and 21 (17.8%) in the midstream-only group (chi square 2.92; $p = 0.57$). Most bacteriurias (65.8%) were caused by *E. coli*. Others were associated with *Proteus mirabilis* and *Klebsiella pneumoniae* (7.9% each); enterococci, *Enterobacter aerogenes*, and *Pseudomonas aeruginosa* (5.3% each); and *G. vaginalis* (2.6%).

DISCUSSION

Several studies have confirmed that meatal cleansing has no significant impact on rates of bacteriuria or contamination in urine cultures from men and boys.^{5,6} In a study of 102 girls aged 2 to 10 years, Lohr et al.⁷ demonstrated that when the labia were spread, only 1% to 2% of voided urine specimens were contaminated. Neither meatal cleansing nor midstream collection reduced this rate of positive culture results.

Other investigators³ reported equal rates of contamination in 200 urine samples, 100 obtained midstream and clean catch, the other 100 obtained from the same women midstream only. However, in this study, rates of contamination for both groups were high (64%), and there were no cases of urinary tract infection. Two other studies provide confirmatory evidence that special cleaning practices before urine samples are obtained are unnecessary. Contamination rates were not significantly different among samples obtained midstream after patients were cleaned with sterile water as compared with samples obtained with no instructions or precautions.² Finally, Immergut et

al.¹ studied 95 ambulatory women who first provided a urine specimen in an unsterile cup with no preparation and then had a subsequent specimen obtained by cystoscopy. Only 5.3% of the voided specimens were contaminated; there was a 95% correlation between cystoscopic and voided specimens.

Our results are limited by the fact that samples were consecutive rather than "matched," that is, they were not from the same woman by use of two different collection methods. Nevertheless, this study adds to the body of evidence that there is little if any added benefit to special preparation for urine collection for culture in either men or women. One possible exception might be for individuals with fecal or urinary incontinence or poor hygiene in whom a large local number of microorganisms might be present.

In another recent study of 982 outpatient urine samples, culture results were compared after incubation for 12 to 16 hours, 36, or 60 hours. There was 98% agreement in results, except for detection of yeasts.⁸ The elimination of special preparatory equipment (e.g. "clean catch" kits) and procedures and the potential for shorter incubation periods for culture could result in considerable cost and time savings for urine sample collection and processing. In our setting,

this change in practice, no longer using "clean catch kits" for obtaining urine specimens, resulted in a supply cost savings of \$78/100 samples.

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