**Objective:** To assess sexually active adolescents’ attitudes toward 3 screening collection techniques for detection of *Chlamydia trachomatis*, *Neisseria gonorrhoeae*, and *Trichomonas vaginalis* using first-void urine (FVU), self-collected vaginal swab specimens, and pelvic examination with clinician-collected endocervical swab specimens.

**Design:** Participants completed a preexamination health survey, provided FVU and self-collected vaginal swab samples, and had a pelvic examination with endocervical swab specimen collection. In a confidential postexamination interview, patients ranked the 3 screening techniques according to preference and responded to qualitative positive and negative descriptors to evaluate each technique.

**Setting:** San Francisco area health maintenance organization and university clinics.

**Participants:** A convenience sample of 155 ethnically diverse females aged 12 to 21 years, who were sexually active and were to have a pelvic examination.

**Main Outcome Measures:** Adolescents’ preferences for and evaluations of 3 sexually transmitted disease screening techniques.

**Results:** Participants preferred the FVU test for sexually transmitted disease screening over the pelvic examination and the self-administered vaginal swab test (P<.001). These results were consistent when controlling for potentially mitigating experiences, including previous pelvic examination, tampon or condom use, and prior pregnancy. In evaluating what they liked and disliked about each of the 3 screening methods, participants described the FVU most positively, the pelvic examination most negatively, and the vaginal swab technique slightly less positively than the FVU.

**Conclusion:** Most sexually active adolescents attending clinics for pelvic examination prefer to be screened for sexually transmitted diseases first by the FVU, second by the self-collected vaginal swab test, and last by the pelvic examination.

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**What Sexually Transmitted Disease Screening Method Does the Adolescent Prefer?**

**Adolescents’ Attitudes Toward First-Void Urine, Self-collected Vaginal Swab, and Pelvic Examination**

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The rate of chlamydial infection remains epidemic among 15- to 19-year-old females, with 2359 cases in every 10000. All major health policy organizations recommend annual chlamydial screening for sexually active adolescent females. The nucleic acid amplification technique applied to urine samples provides a sensitive noninvasive method to screen adolescents for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* and are more cost-effective compared with pelvic examinations. Recently, self-collected vaginal swab tests have been successfully implemented as another method of obtaining sexually transmitted disease (STD) specimens from adolescent and adult women, although this technique awaits approval by the Food and Drug Administration (Rockville, Md). Yet, such STD testing advances have not resulted in universal *C. trachomatis* screening in adolescent females since currently fewer than 1 in 5 eligible adolescents are screened for chlamydia. Why is the screening rate so poor? Clinician-linked barriers to screening have been explored, including lack of time and skill in performing pelvic examinations and in taking sexual histories. Adolescent-linked barriers include fear of the pelvic examination. However, before recommending universal adoption of any new STD collection technique, it is important to review available information on the adolescent client’s experience with such methods as first-void urine (FVU) and the self-collected vaginal swab. In one study, adolescents readily accepted urine-testing methods but no comparisons against any other testing methods were presented. Two other studies showed that teenagers preferred the self-collected swab test to the pelvic examination. However, to our knowledge, no
PARTICIPANTS AND METHODS

PARTICIPANTS

Participants were recruited from adolescent women attending either a university- or health maintenance organization-based clinic for adolescents. Non–English speakers were ineligible to participate.

PROCEDURES

Recruitment

Human subject use review boards at both participating institutions approved this study. Participants were recruited on 3 afternoons per week when most pelvic examinations were scheduled. All young women who were at the clinic for pelvic examination were approached to participate by a trained female research assistant and gave standard demographic recruitment information and signed a consent form.

STD Specimen Collection

Participants were instructed on the proper collection of the FVU (first 20 mL in marked cup) and vaginal specimens (insert swab 1-2 in, rotate around vagina 3 times; repeat procedure with second swab), and then underwent a pelvic examination, at which time 2 endocervical swab samples were obtained by the clinician.

Laboratory Processing

The FVU, 1 vaginal, and 1 endocervical swab specimen (a second endocervical swab specimen was processed in parallel in the hospital laboratory per routine) were assayed for C. trachomatis and N. gonorrhoeae (LCx®; Abbott Laboratories, Chicago, Ill) in the laboratory of one of the authors (J.S.) The second self-collected vaginal swab sample was tested for Trichomonas vaginalis using the Trichomonas In-Pouch TV (Biomed Diagnostics, San Jose, Calif) according to the manufacturer’s instructions. Participants were considered to have a specific STD if any specimen yielded a positive result from either laboratory. Result discrepancies between laboratories were not significant.

MEASURES

Before STD specimen collection, the research assistant obtained demographic information (age, ethnicity, household makeup, work experience, and grade in school) on all potential participants using a recruitment survey. All surveys were piloted for correct wording and content on 26 adolescent females attending the target clinics. Following the recruitment survey, a preexamination survey on reproductive health was given, which consisted of 10 items about the participant’s sexual and reproductive history (ie, sexual risk behaviors, pregnancy, and contraceptive history).

Finally, each participant took part in a postexamination interview in which she was asked to rank the 3 STD testing techniques by preference. She was then asked to rate 10 statements (Table 1) according to how well they described her experience with each testing method (5 positive and 5 negative items) using a 10-point scale (1=disagree completely and 10=agree completely with description). These descriptors were developed during the pilot phase and were the most common terms elicited from an open-ended query (ie, “Describe what you like and dislike about each method”).

STATISTICAL ANALYSES

To analyze rankings, the Friedman test was conducted to evaluate differences in medians among the 3 methods (this tests the null hypothesis, ie, no difference in preference among the 3 methods). Scores for each variable (pelvic examination, vaginal swab, and FVU) were ranked (first choice=1, second choice=2, and third choice=3) and median ranks for variables were compared (the lower the ranking, the higher the preference). For significant findings (P<.05), Wilcoxon rank sum follow-up tests were conducted to evaluate comparisons between pairs of medians and controlled for the type 1 errors across these comparisons at the .05 level. This procedure was used for the total population and for specific subgroups (regular tampon use, condom use at last intercourse, past pelvic examination, and prior pregnancy).

To analyze qualitative descriptors of each testing method, within-subject repeated-measures analyses of variance were used. Because this design gathered responses from each participant for each of the 3 testing methods, within-subject differences could be analyzed, with between-subject differences removed. This method first calculates the mean for each participant for each method and then examines the mean differences for the testing techniques being compared. To adjust for multiple comparisons, a 97.5% confidence interval was used for these analyses.

A total of 189 sexually active young women who were to have a pelvic examination on the day of the visit were invited to participate. One hundred fifty-five patients participated (mean age, 16.7 years; range, 12-21 years). They were racially/ethnically diverse: 34% were African American, 19% were white, 17% were Asian American, 13% were Latin American, and 17% were of mixed or other races. Those who refused to participate (n=34) gave the following reasons for nonparticipation: lack of time (n=12), unwillingness to do the vaginal swab test (n=11), pelvic examination discomfort (n=4), confidentiality concerns (n=1), and 6 cited other miscellaneous reasons. Those who refused were older (mean age, 17.39 vs 16.70 years; P=.01) and more likely to be African American (59% vs 34%; P=.01) than participants.

CLINICAL VISIT

Reasons for the visit included (>1 response possible) annual pelvic examination (54%), STD screen (40%), contraception (28%), pregnancy test (15%), other gynecological examination (14%), and miscellaneous (4%).

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logic problems (9%), and reasons not related to reproductive health (13%). Clinical diagnoses included normal results in 69% of patients, reproductive health–related in 29%, and other nonreproductive diagnoses in 2%. Sexually transmitted diseases detected included C trachomatis (6.1%), N gonorrhoeae (3.1%), and T vaginalis (4.7%).

**ADOLESCENTS’ PREFERENCES TOWARD THE 3 STD SCREENING METHODS**

The median rank for the FVU method was significantly lower (greater preference) (median, 1.59) than the self-collected vaginal swab (median, 2.01) and the pelvic examination (median, 2.39) (Table 2). There were no differences in rankings by prior pelvic examination, regular tampon use, condom use at last sexual intercourse, age, ethnicity, or prior STD history. When asked what they liked and disliked about each method, using a list of 5 positive and 5 negative descriptors, the participants scored the pelvic examination more negatively and the FVU more positively, with the vaginal swab method scoring slightly less positively than the FVU (Table 1). In general, they felt more comfortable and less embarrassed with the FVU and vaginal swab methods compared with the pelvic examination and described more pain and inconvenience with the pelvic examination compared with the other methods. However, they trusted the results of the pelvic examination more than the vaginal swab and FVU methods (P<.001). Participants seemed to worry that they might self-administer the vaginal swab test incorrectly, thus having less faith in that test compared with the FVU (P<.001) and pelvic examinations (P<.05).

**COMMENT**

Participants ranked the pelvic examination last, the self-collected vaginal swab method second, and the FVU first in preference for STD screening (Table 2). This preference was upheld in analyses of subgroups with more reproductive experiences, eg, tampon use and prior pelvic examination. The pelvic examination, the current standard of care for STD screening, not only was ranked last by preference but also was consistently evaluated highest for the negative attributes, such as anxiety and pain, and lowest for the positive attributes, such as comfort and control over collection method. This last-place finish for the pelvic examination occurred even though most participants were prescheduled for a pelvic examination and most had prior pelvic examination experience. In contrast, the self-collected vaginal swab method was ranked higher than the pelvic examination on both preference and the participants’ evaluation profiles regarding negative and positive attributes.

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**Table 1. Qualitative Descriptors by Sexually Transmitted Disease Screening Technique**

<table>
<thead>
<tr>
<th>Description of Testing Method</th>
<th>FVU and Pelvic Examination</th>
<th>FVU and Vaginal Swab</th>
<th>Vaginal Swab and Pelvic Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive attributes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Felt comfortable</td>
<td>3.84 (3.17-4.52)†</td>
<td>1.70 (1.10-2.29)†</td>
<td>2.15 (1.39-2.91)†</td>
</tr>
<tr>
<td>Felt in control</td>
<td>2.21 (1.56-2.86)†</td>
<td>0.31 (-0.10 to 0.72)</td>
<td>1.90 (1.29-2.50)†</td>
</tr>
<tr>
<td>Felt I was taking care of my health</td>
<td>-0.16 (-0.50 to 0.18)</td>
<td>0.02 (-0.31 to 0.35)</td>
<td>-0.18 (-0.47 to 0.10)</td>
</tr>
<tr>
<td>Felt relaxed</td>
<td>3.09 (2.45-3.73)‡</td>
<td>1.14 (0.52-1.75)‡</td>
<td>1.95 (1.33-2.57)‡</td>
</tr>
<tr>
<td>Trusted the test</td>
<td>-0.67 (-1.08 to -2.65)†</td>
<td>0.18 (-0.11 to 0.47)</td>
<td>-0.85 (-1.27 to -0.44)</td>
</tr>
<tr>
<td>Negative attributes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was anxious</td>
<td>-0.95 (-1.65 to -0.26)‡</td>
<td>-0.03 (-0.53 to -0.46)</td>
<td>-0.92 (-1.57 to -0.27)‡</td>
</tr>
<tr>
<td>Felt embarrassed</td>
<td>-2.44 (-3.04 to -1.83)‡</td>
<td>-0.44 (-0.91 to 0.05)</td>
<td>-2.00 (-2.64 to -1.36)‡</td>
</tr>
<tr>
<td>Was inconvenient</td>
<td>-1.50 (-2.12 to -0.89)‡</td>
<td>-0.15 (-0.62 to -0.33)</td>
<td>-1.36 (-1.97 to -0.75)‡</td>
</tr>
<tr>
<td>Was painful</td>
<td>-3.99 (-4.58 to -3.41)‡</td>
<td>-0.70 (-0.96 to 0.45)</td>
<td>-3.39 (-3.88 to -2.70)‡</td>
</tr>
<tr>
<td>Worried I might do the test wrong</td>
<td>-0.42 (-1.02 to 0.18)</td>
<td>-1.25 (-1.86 to -0.64)</td>
<td>0.83 (0.20-1.45)‡</td>
</tr>
</tbody>
</table>

*Data are given as difference between the means (97.5% confidence interval). A positive mean difference value indicates a more favorable assessment of the first screening method in each pair. A negative mean difference value indicates a more favorable assessment of the second screening method in each pair. FVU indicates first-void urine.

†P<.001.
‡P<.05.

**Table 2. Adolescents’ Ranking of Sexually Transmitted Disease Screening Methods**

<table>
<thead>
<tr>
<th>Study Category</th>
<th>Rank Placement</th>
<th>Mean Rank</th>
<th>Rank Placement</th>
<th>Mean Rank</th>
<th>Rank Placement</th>
<th>Mean Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FVU</td>
<td>Vaginal Swab</td>
<td>Pelvic Examination</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 2 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All participants (n = 153)</td>
<td>88 39 26</td>
<td>1.59‡</td>
<td>25 101 27</td>
<td>2.01§</td>
<td>40 13 100</td>
<td>2.39 P&lt;.001</td>
</tr>
<tr>
<td>Past pelvic examination (n = 98)</td>
<td>48 30 20</td>
<td>1.60‡</td>
<td>19 58 21</td>
<td>2.01</td>
<td>31 10 57</td>
<td>2.02 P&lt;.001</td>
</tr>
<tr>
<td>Condom use (n = 96)</td>
<td>29 18 9</td>
<td>1.66‡</td>
<td>13 32 11</td>
<td>2.01</td>
<td>14 6 36</td>
<td>2.33 P&lt;.001</td>
</tr>
<tr>
<td>≥1 Pregnancy (n = 35)</td>
<td>18 11 6</td>
<td>1.63</td>
<td>7 23 5</td>
<td>1.63§</td>
<td>10 1 24</td>
<td>2.75 P&lt;.03</td>
</tr>
</tbody>
</table>

*Data are given as number of participants unless otherwise indicated. FVU indicates first-void urine.

†Friedman tests yielding P<.05 indicate that at least 1 of the 3 testing method comparisons is significantly different.

‡Follow-up Wilcoxon tests showed that the FVU test ranked significantly higher than the vaginal swab (P<.05) and the pelvic examination.

§Follow-up Wilcoxon tests showed that the self-collected vaginal swab method ranked significantly higher than the pelvic examination (P<.05).
In summary, chlamydia is a major public health concern in the female adolescent. With urine and vaginal sampling possible for STD screening, the invasive, costly, time-consuming, and often uncomfortable pelvic examination can now be reserved to obtain a Papanicolaou smear as needed and to assess pregnancy and gynecologic pathology as warranted. A revolution of STD testing is at hand but more research is needed to look at barriers to STD screening from all aspects of the health care system before consumer-friendly universal STD screening can be successful.

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REFERENCES


