

American College Health Association Annual Pap Test and Sexually Transmitted Infection Survey: 2006

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Abstract. Objective: The authors describe the cervical cytology and sexually transmitted infection (STI) testing patterns of US college health centers. **Participants and Methods:** A total of 128 self-selected US college health centers—representing more than 2 million college students—completed an online survey during February and March 2007. **Results:** Almost 13% of cervical cytology results were abnormal; most of these were atypical squamous cells of undetermined significance and low-grade squamous intraepithelial lesions. In women, 2.9% of chlamydia tests and 0.4% of gonorrhea tests were positive. Human immunodeficiency virus (HIV) and syphilis tests were positive in 0.1% and 0.3% of students tested, respectively. Herpes simplex virus type 1 (HSV-1) accounted for 59.9% of genital herpes infections. **Conclusions:** College health centers are important sources for Pap and STI test data. Pap tests frequently yield low-grade abnormalities, and screening tests for chlamydia and especially gonorrhea are infrequently positive. Rates of HIV and syphilis in this population are low, raising concerns about positive predictive value when screening low-risk students. A majority of genital herpes infections are caused by HSV-1.

Keywords: cervical cytology, chlamydia, college health, herpes, sexually transmitted infections

For the past 17 years, the American College Health Association (ACHA) has conducted an annual survey of college and university health centers to track Pap smear and sexually transmitted infection (STI) test data in this population. Originally developed to better understand the link between human papillomavirus (HPV) infection and cervical cytopathology, the survey has evolved into a more general assessment of screening practices and STI incidence. Survey results have become an important source of

benchmark data for many college health centers. Although the STIs of interest are reportable in most states, college student status is not routinely collected in these reports. As a result, there is no comprehensive source of data at the government level about the prevalence of these infections in college health centers or college student populations.

Researchers assessing the prevalence of STIs in college populations have usually focused on a single college or university. In an early study of HIV prevalence in a national sample of students, Gayle et al¹ used residual blood specimens and found that 0.2% were positive for the HIV antibody. Recently, investigators assessing chlamydia incidence in college students found a wide variation in positivity depending on the population studied.^{2,3} Roberts et al⁴ demonstrated that herpes simplex virus type 1 (HSV-1) is a common cause of genital herpes infections in college students, but this study was limited to a single institution.

There are approximately 4,100 degree-granting institutions of higher education in the United States, enrolling more than 17 million students.⁵ These institutions comprise a mix of public and private institutions, technical schools, community colleges, 4-year colleges, and large research universities. The total number of schools that have a designated health center or in some way provide health care services to their students is unknown, and there is no accessible database with this information. At the time the survey was distributed, ACHA had a membership of 963 institutions and 3,350 individuals, with another 200 to 300 non-member schools included in their mailing lists (R. Ward, e-mail communication, October 6, 2008).

METHODS

In January 2007, ACHA invited individuals representing approximately 1,100 US colleges and universities to participate in the annual ACHA Pap Test and STI Survey via

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e-mail. The mailing list included all current ACHA institutional and individual members, previous survey participants, and several nonmember institutions included in ACHA's database. We also posted information about the survey on the national student health service listserv. Invitations included explanatory information and a link to the survey form. The survey was hosted online at a commercial survey site (WebSurveyor; Vovici, Inc, Dulles, VA). Respondents were able to complete surveys in multiple sittings between February 1, 2007, and March 23, 2007. We permitted only 1 response per institution.

As members of the ACHA STI committee, we developed the survey instrument, which included questions related to institutional enrollment and health center use, screening practices for Pap and STI tests, and Pap and STI test result data. All data pertained to the period January 1, 2006, through December 31, 2006 (ie, calendar year 2006). Most questions were identical to those in previous versions of the survey.⁶

We excluded incomplete responses from the analysis when computing positivity rates and the distribution of results for Pap and STI testing. To assess the internal consistency of reported data for these items, we compared the sum of positive and negative results for a given test type with the reported total number of tests done. If the sum varied by more than 5% from the total, we did not include the data for that item in the analysis reported here. We used SPSS version 15 (SPSS Inc, Chicago, IL) for statistical analysis.

RESULTS

Survey respondents represented 128 institutions, with a combined enrollment of 2,178,086 students (range = 840–51,200 students; $M = 17,016$, $SD = 12,207$). Table 1 shows the variety of respondents' institutional characteristics. In 2006, staff at these student health centers conducted 2.9 million medical visits ($M = 23,969$, $SD = 22,487$), of which 62% were from female students; 413,583 visits (23% of all female visits) were characterized as women's health visits. Of the women's health visits, 65% were conducted by an advance practice nurse, 18% by nongynecologist physicians, 7% by nurses, 5% by gynecologists, and 4% by physician assistants.

Cervical Cytology

Several survey questions addressed current practices related to cervical cytology screening done in the health center, including the recommended age for initiation of Pap testing in their student population. About half ($n = 62$) of these health centers recommended a first Pap at 3 years after first intercourse; 25 schools (19.8%) recommend it at onset of sexual activity, 16 schools (12.8%) recommend it at age 21, 8 schools (6.4%) recommended it at age 18, and the remaining 11.9% of schools had no uniform practice. Most (75.4%) respondents' practice was to routinely document a patient's age at first intercourse.

With regard to modalities offered for Pap testing and follow-up (we allowed multiple responses), 109 schools (85.2%) offered liquid-based cytology with reflex HPV

TABLE 1. Characteristics of Respondent Institutions

Characteristic	%
ACHA member	93.0
Institutional control	
Public	72.2
Private	27.8
Community size	
Urban > 1 million	13.3
Urban < 1 million	35.9
Urban < 100,000	21.1
Suburban	14.1
Rural	14.8
Other	0.8

Note. ACHA = American College Health Association.

testing, 64 schools (50.0%) offered liquid-based without reflex HPV testing, and 45 schools (35.4%) used conventional slide cytology (Pap smear). Follow-up procedures for management of abnormal cytology were less likely to be available on-site: 32.3% of respondents provided colposcopy, 23.6% offered cryotherapy, and 7.1% performed loop electrosurgical excision procedure (LEEP) in house.

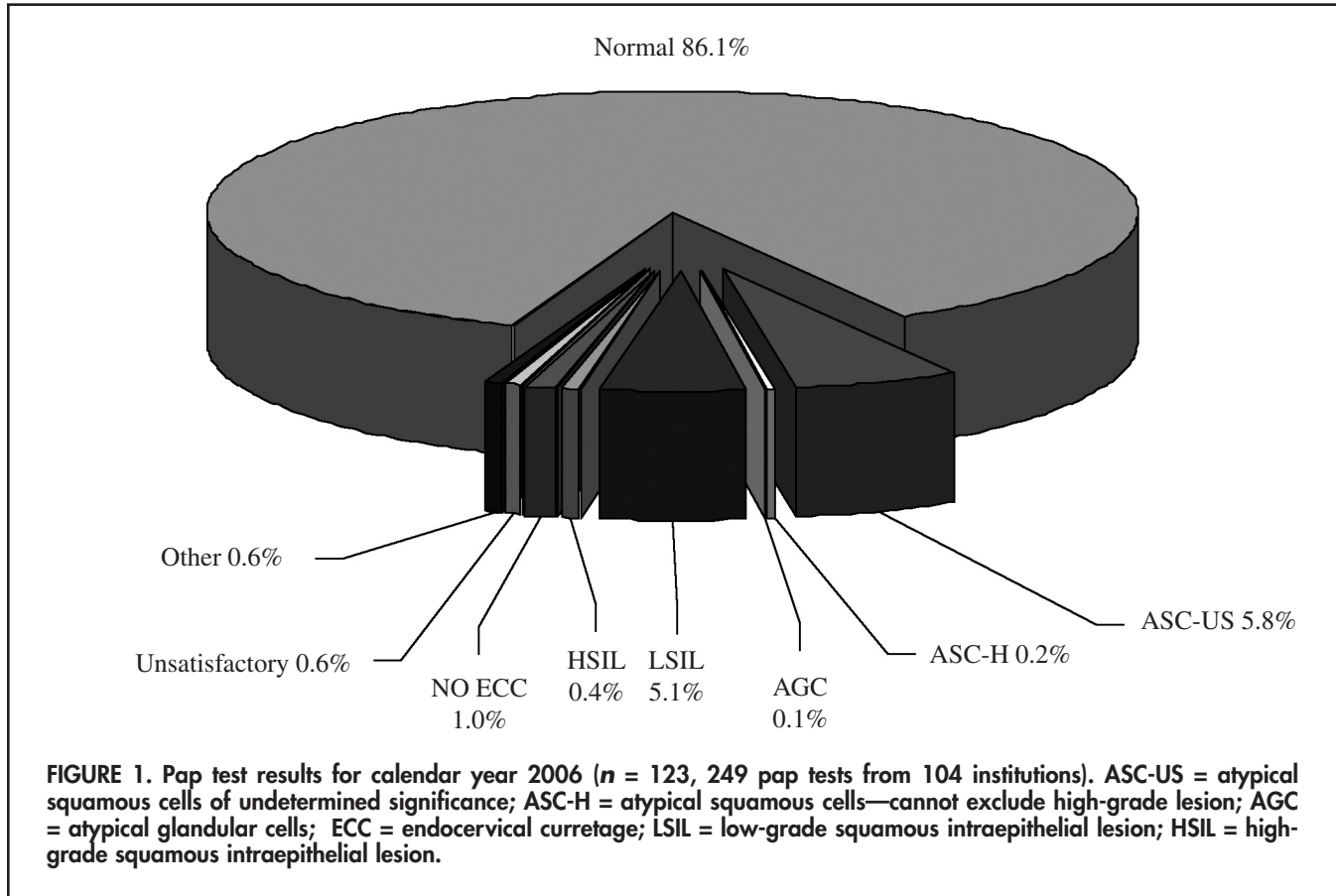
Two-thirds of student health centers tracked cervical cytology results with logbooks: 43.3% by use of a tickler file, 34.6% by laboratory-generated reminders, 26.0% by computerized tracking programs, and 16.5% by electronic medical record systems. Only a single respondent indicated that his or her center had no formal tracking system in place.

Cervical Cytology Test Results

In all, 104 respondents provided data on the number and outcome of Pap or cytology tests. After applying our inclusion criteria as specified previously, we included 123,249 tests in the analysis. Of these, 106,078 tests (86.1%) were normal. We defined abnormal results (12.9%) as those reported as atypical squamous cells of undetermined significance (ASC-US), atypical squamous cells—cannot exclude high-grade lesion (ASC-H), atypical glandular cells (AGC), low-grade squamous intraepithelial lesion (LSIL), high-grade squamous intraepithelial lesion (HSIL), unsatisfactory, or other. We categorized most abnormal findings as ASC-US (5.8%) or LSIL (5.1%; see Figure 1).

The usual practice for managing a first ASC-US Pap test showed some variation: 66.9% of schools routinely performed HPV DNA testing, and 23.1% recommend repeating the Pap test in 4 to 6 months. One respondent reported that his or her school referred or performed immediate colposcopy. The practice is not standard and varied by provider for 9.1% of respondents.

Respondents reported follow-up testing results for 6,917 ASC-US Pap tests: 4,224 (61.1%) conducted HPV DNA testing, of which 2,065 (48.9%) were positive for high-risk



types of HPV (HR HPV); 1,148 patients (16.6%) had repeat cytology at 4 to 6 months, of which 614 (53.5%) were abnormal; and 869 patients (12.6%) underwent colposcopy. For 569 (8.2%) tests, follow-up test results were unknown, and 107 (1.5%) were worked up through an unspecified strategy.

Respondents provided additional data regarding colposcopy results for 4,767 patients. On the survey, respondents documented colposcopic results for each of 4 indications for colposcopy (initial ASC-US, HR HPV identified, abnormal follow-up Pap test, or other indication). Unfortunately, for half of these patients no outcome data was available (see Table 2).

Sexually Transmitted Infection Testing

Nearly all schools (93.8%) offered some type of routine STI screening for asymptomatic women, and 83.6% offered routine screening for asymptomatic men. Of schools offering STI screening, 96.9% provided chlamydia tests and 94.5% provided gonorrhea tests. Slightly fewer schools offered screening for HIV (84.4%), syphilis (87.5%), hepatitis B (66.4%), trichomoniasis (55.5%), and herpes (52.3%).

Specimen collection methods for chlamydia testing were fairly uniform. In female patients, 77.9% of schools collected tests using a cervical swab as the preferred specimen. A minority (5.7%) used urine specimens, and 15.6% indicated that the specimen varied by practitioner or that there was

no preference. For male patients, 71.1% of schools reported that urine was the standard specimen used for chlamydia tests, 15.7% favored a urethral swab, and 11.6% indicated that it varied or that there was no preference.

Most survey respondents provided numerator (number of positive tests) and denominator (number of tests done) data for chlamydia tests and gonorrhea tests conducted at their health center, allowing us to calculate test positivity. We excluded incomplete or inconsistent data from this analysis using the same methodology we used for cervical cytology tests. Separate questions asked for totals of all persons tested (undifferentiated by sex) and test results grouped by sex (see Table 3).

The survey results indicate that HIV testing is widely available in college health centers. Among 108 (84.4%) schools responding to this question, 35% offered confidential and anonymous testing for HIV, 58% offered confidential tests only, and 2% offered anonymous testing only. With regard to HIV test type, 83.6% of respondents offered conventional serum antibody tests, 19.5% offered oral fluid testing, 14.1% offered rapid testing of blood specimens, and 13.3% offered rapid oral fluid testing (categories not exclusive). Also, 104 respondents reported HIV test result data, totaling 39,655 tests. Of these, 51 tests (0.13%) were positive. We did not ascertain whether this included only confirmed (Western blot) results versus screening (ELISA) results.

TABLE 2. Colposcopy Results, by Indication (%)

Indication	<i>n</i>	Normal	CIN 1	CIN 2 or 3	Unknown
First ASC-US	754	45.2	6.8	3.4	44.6
High-risk HPV positive	1,309	24.8	19.3	4.4	51.5
Abnormal second pap	1,659	27.6	15.1	6.1	51.1
Unspecified	1,045	15.6	29.2	6.1	51.1

Note. ASC-US = atypical squamous cells of undetermined significance; CIN = cervical dysplasia; HPV = human papillomavirus.

TABLE 3. Results of Chlamydia and Gonorrhea Testing

Group	Tests (<i>n</i>)	% positive
Chlamydia		
All	133,108	3.6
Women	82,427	2.9
Men	18,669	6.3
Gonorrhea		
All	107,456	0.6
Women	60,788	0.4
Men	16,173	1.4

Note. Not all respondents reported gender-specific test data.

Ninety-eight respondents submitted syphilis testing data, totaling 25,491 tests. Of these, 75 (0.29%) were positive. In addition, 66 schools reported a total of 508 cases of trichomoniasis. We did not ascertain the overall number of trichomoniasis tests conducted.

Respondents reported multiple testing modalities for genital herpes diagnosis testing. Most (80.3%) schools used viral culture; 20.5% used polymerase chain reaction (PCR), 9.4% used antigen tests, and 3.1% used Tzanck smears (multiple responses permitted). In addition, 66.9% of respondents reported that type-specific serology was available for diagnostic testing or screening. Genital herpes diagnosis test result data were available from 98 schools, and 76 schools provided type-specific results. This group reported 965 positive tests (by viral culture or PCR), and HSV-1 caused most (59.9%) of these infections. Respondents reported an additional 621 positive tests results as type unknown.

COMMENT

The ACHA Pap Test and STI Survey provides useful information regarding abnormal cervical cytology and STIs seen at college and university health centers. One current area of interest is the recommended age for initiation of Pap testing. The trend away from initiating Pap testing at onset of sexual activity and toward doing so 3 years after first intercourse or age 21—whichever comes first—continues (as per current guidelines⁷). The uptake of these recom-

mendations is a minor marker of evidence-based focus in college health; our results show that this has now become a norm among responding schools. Of note, the framing of the question in the survey used 3 years after first intercourse and age 21 as 2 separate response items. We plan to modify the question in future surveys to better reflect the language of current recommendations.

Incorporating new guidelines for Pap testing and management may result in changes to the way health centers provide STI testing to female patients as well. One of the potential outcomes of wider adoption of these guidelines in young women is that it may eliminate the need for the annual gynecological exam. This presents potential challenges—fewer women being screened for STIs—and opportunities—many women may find screening with urine tests, rather than cervical swabs, more acceptable. Some health center staff already promote sexual health counseling and testing visits during which they use urine-based nucleic acid amplification testing (NAAT) for women who do not yet meet criteria for Pap testing. Our data show an increasing use of urine-based chlamydia testing in college students, particularly in men but for women as well. Health center visits for the HPV vaccine may also become the opportunity to deliver these important services.

Also significant in this survey is the trend toward increased use of liquid-based cervical cytology screening technology with reflex HPV testing. Commensurate with this is the steady erosion in use of conventional Pap smear slides. In 2006, only 35.4% of health centers still used a conventional slide compared with 63.4% of centers in the 2003 survey.⁸

The overall abnormal rate for Pap tests in this survey was 12.9%. The large majority of abnormal results comprised ASC-US or LSIL at rates that are typical (as evidenced by previous surveys) and serve as useful benchmarks. The most common choice for standard management of a first ASC-US Pap test among our respondents is HPV DNA testing, a relatively new option for providers. Half of those patients who underwent DNA tests were positive for high-risk HPV. The next most common choice was to repeat the Pap smear in 4 to 6 months, but this is becoming a less frequently advised choice for young college women. Similar to HPV DNA testing, about half of these repeated Pap tests were abnormal. Over the past 3 years, use of HPV

DNA testing has become increasingly the test of choice for college health providers in managing ASC-US results. New guidelines with an emphasis on prolongation of observation in young women will likely lead to further decreases in the number of follow-up Pap smears.

Interpretation of the survey data regarding colposcopic evaluation of ASC-US Pap tests is limited because nearly half of responses had unknown or incomplete data for this group of patients. This includes abnormal Pap tests that did not fall neatly into the survey period, patients who had been referred out for evaluation, or data that was otherwise not subject to easy extraction from records.

These data appear to reinforce the findings from other studies that, especially in this age group, persistence of HPV infection and histologically higher-grade lesions are infrequent (consistently in the range of 5%). Knowing that a fair proportion of moderate-dysplasia (CIN 2) or severe-dysplasia (CIN 3) lesions are likely to regress in healthy young adults, more observation and less intervention, with its attendant morbidities, is the most evidence-based course of action at this time.

The STI data are consistent with national trends. Chlamydia and gonorrhea tests are the most common STI tests conducted, offered by nearly all schools surveyed. Although gonorrhea infection is much less common than is chlamydia, most laboratories run both tests simultaneously. Consistent with published guidelines,⁹ nearly all health centers stated that they routinely screen sexually active women for chlamydia. Chlamydia was the most common bacterial STI identified in this population, with an overall positivity rate of 3.6%. Men had higher positivity rates of chlamydia and gonorrhea than did women, but this likely reflects more selective testing in men; the survey did not distinguish between tests done for screening versus those done for diagnosis. For chlamydia and gonorrhea, respondents reported 4 times as many test results for women as men.

Although most college health centers now use highly sensitive and specific NAATs for chlamydia and gonorrhea, there are still concerns about the positive predictive value for these tests when used in low-risk populations with a low prevalence of disease. This is particularly the case for gonorrhea, for which even a test specificity of 99.5% still accompanies a positive predictive value in college women of less than 50%. Thus, many positive gonorrhea results may in fact be false positives. Many health centers may benefit from applying selective screening criteria, rather than providing universal screening for gonorrhea. However, this is an area of research that is data-poor, as ideal gonorrhea-screening criteria have not been developed for this population.

HIV testing is widely available, and rapid testing is increasingly an option for many students. The overall positivity rate in surveyed health centers was extremely low at 0.13% (1 in 769 tests). As with gonorrhea, a concern about the positive predictive value of a positive test is again relevant. Using survey data as the estimate of prevalence (0.13%), we calculated the positive predictive value for a

screening HIV antibody test (specificity = 99.9%) to be only 56% in this population. Health centers that conduct a lot of HIV antibody testing in lower-risk students are likely to find more false positive tests than true positives.

Although viral culture remains the most common diagnostic test for herpes infection in the surveyed health centers, more schools are beginning to use PCR, which offers a much improved test sensitivity but is not available in all settings. In students tested for herpes with either PCR or a culture from a genital site (presumably for evaluation of symptoms), 22.1% were positive. Although many schools could not provide type-specific data, most (60%) of the subsample of positive test results with a known type were caused by HSV-1. This finding is consistent with other published studies showing that HSV-1 has become the most common cause of genital herpes in college students.^{4,10}

Limitations

First, participating schools were self-selected and are not necessarily representative of all college health centers. There is likely a strong bias toward participation from schools with better data systems and the means to track and report the data requested by the survey. Furthermore, respondents may have entered data incorrectly or had nothing to report for certain questions. We excluded data from certain analyses from up to 19% of respondent schools because of incomplete or missing data for Pap or STI test results. The detail requested in some of the questions may have strained the ability of many centers to report their own data. Fortunately, many centers have integrated newer data-tracking mechanisms with the implementation of clinical information systems in recent years. Last, reporting of test positivity in our analysis should not be interpreted as being equivalent to incidence. In this survey, we did not assess an institution's complete ascertainment of either numerator or denominator data for STIs, and the true incidence of these infections in college populations may vary from data reported here.

Conclusions

Overall, the results of this 2006 ACHA Pap Test and STI Survey provide a valuable compendium of usual practices for sexual health testing, benchmark values for the tests analyzed, and recent trends among practices and test results. We are eager to promote and contribute to further study of these important conditions in this population.

ACKNOWLEDGMENT

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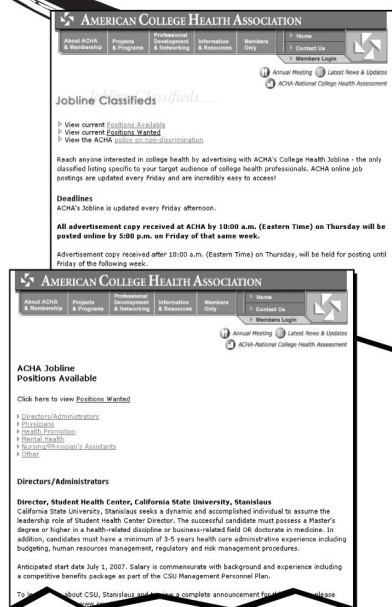
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