

# Implementation of a Screening Program for Chlamydial Infection in Incarcerated Adolescents

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**Background:** In collaboration with the Houston Department of Health and Human Services, the authors implemented and evaluated a urine-based chlamydia screening program in incarcerated youth in Harris County, Texas, and assessed predictor variables for infection.

**Goal:** To implement and evaluate chlamydia screening in incarcerated youth.

**Study Design:** The authors determined prevalence of chlamydial infection, treatment rates, and predictor variables in 589 youth and repeated the measures 6 months later in 975 additional youth.

**Results:** Initially, the prevalence of infection was 9.6% in males and 28.1% in females; 88% of infected youth were treated while incarcerated. White males had a significantly lower prevalence of chlamydial infection; however, consistent condom use was not associated with a lower prevalence of chlamydia. In the 6-month assessment of chlamydia prevalence in 975 youth, prevalence and treatment rates remained high and predictor variables were similar.

**Conclusion:** The authors instituted a screening program for chlamydial infection in incarcerated youth that was performing well at reassessment 6 months later.

INCARCERATED YOUTH have a high prevalence of infection with *Chlamydia trachomatis* and other sexually transmitted diseases (STDs).<sup>1,2</sup> Experts recommend that the criminal justice system improve its screening for chlamydia and other STDs in this high-risk population.<sup>1,3,4</sup> The recent availability of accurate urine-based nucleic acid testing has made screening for chlamydial infection practical.<sup>5</sup>

Urine-based nucleic acid screening has been increasingly used in adolescents. In incarcerated youth in Birmingham, Oh et al<sup>2</sup> determined that the prevalence of chlamydial infection was 28% in females and 8.8% in males. The prevalences of infection for females and males in this study are among the highest values reported for US adolescents.<sup>6-15</sup> In other studies of incarcerated youth, 5.9% of

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5,754 males and females in Seattle were infected,<sup>6</sup> as were 27% of females in Chicago<sup>15</sup> and 16% in San Francisco.<sup>15</sup> Of the studies of incarcerated youth, all apparently were performed under research conditions, except for the program in San Francisco.<sup>15</sup> This report is the first detailed description of a permanent screening program.

The purpose of this study was to describe the implementation of a screening program for chlamydial infection in incarcerated adolescents in Harris County, Texas. The secondary goal was to evaluate predictor variables that might identify subgroups that did not need screening. Baseline data were obtained, the program was initiated, and the program was evaluated after 6 months.

## Methods

The Harris County Juvenile Detention Center (HCJDC) serves Harris County, Texas, which has a population of approximately 3.1 million people. An average of 620 youth are incarcerated each month (range, 503–750 youth). Approximately 65% are released within 48 hours, and almost all of the remaining 200 youth per month are incarcerated for at least 2 weeks. These latter adolescents receive a health assessment from an medical doctor or nurse practitioner within 7 days of their arrest, so that the clinicians perform approximately 10 assessments per day.

In June to August of 1998, 589 consecutive HCJDC admissions who stayed longer than 48 hours received a health assessment, which included questions regarding sexual history, and provided a first-catch urine sample. Clinicians described the purpose of this sample to the youth, who gave verbal consent for the test. A total of 589 of 594 eligible persons (99.2%) participated. The Houston Department of Health and Human Services (HDHHS) performed free testing for chlamydia using a transcription-mediated amplification procedure to qualitatively detect chlamydial ribonucleic acid (Gen-Probe Amplified *Chlamydia tracho-*

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TABLE 1. Prevalence of Chlamydial Infection by Sex, Age, and Race or Ethnicity

	Age (y)		Race/Ethnicity*		
	< 14	≥ 14	Black	Hispanic	White
Males					
All	2.6% (1/38)	10.2% (42/412)	13.5% (26/193)	10.5% (16/152)	1.0% (1/100)
Sexually active	3.4% (1/29)	11.4% (41/360)	15.0% (26/173)	11.1% (15/135)	1.2% (1/86)
Females					
All	13.0% (3/23)	31.0% (36/116)	29.0% (18/62)	35.3% (12/34)	16.7% (6/36)
Sexually active	17.6% (3/17)	31.0% (35/113)	31.0% (18/58)	37.9% (11/29)	16.7% (6/36)

\*June to August 1998, N = 589.

\*An additional 0/12 Asians were infected.

*matis* Assay; Gen-Probe, San Diego, CA). The manufacturer reports a sensitivity and specificity of 83% and 99% in women and 94% and 97% in men, respectively. The cost of supplies, staff time, and overhead is approximately \$10 per test (HDHHS pays the manufacturer \$8 per test, and the laboratory director estimated that each test cost \$2 in staff time and overhead).

Positive results were reported within 72 hours. Incarcerated youth who were staying for more than 7 days were treated with doxycycline, whereas youth staying for less than 7 days were treated with azithromycin. Youth who had been released before the results of testing were available were reported to the HDHHS, which assigned a field worker to contact these youth and arrange for them to attend a HDHHS STD clinic for treatment. HDHHS contacted 100% of released youth who were untreated but did not keep records of the percentage who received treatment. The medical staff of the HCJDC reviewed the medical records of youth readmitted to the facility to determine if they had an untreated chlamydial infection diagnosed during a previous admission.

The head nurse kept a log of the youth who had a chlamydia test and of the positive results. A research assistant created a database integrating this information with demographic data from the detention center intake log and with sexual histories and STD symptoms from chart review. The research assistant also used the intake and chlamydia logs to determine the number of youth who were released and readmitted to the HCJDC during the first year of the screening program and the number of youth who had positive test results for chlamydia on both admissions, and their treatment histories.

The initial results indicated that the screening program was needed and was practical; therefore, chlamydia screening was made a permanent part of HCJDC medical services in September 1998. In January to May of 1999, we reevaluated the program by analyzing the results of screening and treatment of 975 consecutive youth tested during these months.

We used descriptive statistics and binomial exact confidence intervals to summarize the demographic data and the

prevalence of infection; and contingency table analysis and the Fisher exact test to evaluate age, race or ethnicity, and consistency of condom use as predictors of whether subjects had a high or low risk of chlamydial infection. We calculated the prevalence of chlamydia in all youth and in those who admitted to sexual activity. Level of significance was  $P = 0.05$ .

## Results

During the initial assessment, the prevalence of chlamydial infection was 9.6% in males (43 of 450; 95% CI, 7.0–12.7%) and 28.1% in females (39 of 139; 95% CI, 20.8–36.3%). Excluding those youth who said that they had never been sexually active, the prevalence in males was 10.3% (41 of 398) and 29.2% in females (38 of 130). Of youth who denied ever having had sexual intercourse, 2 of 61 (3.3%) were infected (1 male, 1 female).

Prevalence of chlamydia by sex, age, and race or ethnicity is presented in Table 1 for all youth and for those who said that they were sexually active. Of infected subjects, 81.4% of males and 84.6% of females were asymptomatic. Of adolescents who had positive test results, 72 of 82 (88%) were still in detention when the results were available and were treated.

In all youth, there were no statistically significant differences in prevalence of chlamydial infection between subjects with or without the predictor variables of age, race or ethnicity, or consistency of condom use. However, the prevalence of chlamydia was lower in white males compared with black ( $P = 0.0002$ ) or Hispanic ( $P = 0.002$ ) males. Results were similar for those youth who said that they were sexually active. Among males, 13 of 131 (9.9%) who said they always used condoms were infected, compared with 25 of 204 (12.3%) who sometimes or never used condoms. Among females, these proportions were 25.0% (8 of 32) and 31.8% (27 of 84).

In the reevaluation of the program during January to May of 1999, the prevalence of chlamydial infection was 6.7% in males (54 of 808; 95% CI, 5.1–8.6%) and 23.4% in females (39/167; 95% CI, 17.2–30.5%). Prevalence of chlamydia by

sex, age, and race or ethnicity were similar to those in the initial assessment. Of infected adolescents, 79 of 93 (85%) were still in detention and were treated.

In the second assessment, there were no statistically significant differences in the prevalence of chlamydial infection between subjects with or without the predictor variables age or race or ethnicity, except that chlamydia was less prevalent in white males compared with black ( $P < 0.0001$ ) or Hispanic ( $P = 0.02$ ) males. Furthermore, chlamydia was less prevalent in Hispanic males compared with black males ( $P = 0.02$ ). The lower prevalence for males younger than 14 years compared with males 14 years or older was significant ( $P = 0.05$ ).

During the period of study between June 1, 1998 and May 31, 1999, 102 males and 35 females were readmitted to the HCJDC and rescreened. Of these, 14 were infected on both the initial and second admission (11 males, 3 females); 5 of 11 males and 1 of 3 females had been successfully treated during the first admission. Therefore, the reinfection rate was 4.4% (6 of 137 youths; males, 4.9%; females, 2.9%). The median time to reinfection was 6 months (range, 3.5–11.5 months). The median time to readmission in the untreated youth was 22 days (range, 7–72 days).

### Discussion

This study showed that it was practical to screen and treat chlamydia in this high-risk population. This program is now part of routine health care. Given the small nursing staff and the large volume of detained youth, we were not able to screen the 400 youth per month who were released within 48 hours because the medical staff could not manage this amount of extra work. To screen this group, we would need an additional staff person to collect urine samples during the period of peak admissions from 11 AM to 7 PM. If we were able to do this, we could increase the number of identified infected youth by approximately 100%. However, we would not be able to treat these youth before they were released, because test results are not available for 48 to 72 hours.

We were able to implement this program because HDHHS was willing to perform the testing, which costs an estimated \$10 per adolescent. Other studies have shown that incarcerated youth also have a high risk of gonorrheal infection (e.g., 11% of females in Chicago, 17% in San Francisco<sup>15</sup>). We were not able to screen for this pathogen, because HDHHS does not yet have urine-based screening for *Neisseria gonorrhoeae*.

Experts recommend reassessing a screening program after it has been initiated.<sup>16</sup> In our reassessment from January to May of 1999, high rates of chlamydial infection continued, and we were able to treat most youth (85%) while they were still incarcerated. The nursing staff found the extra work load acceptable.

The results of our evaluation of repeat infections in youth

who were readmitted to the HCJDC indicated that the reinfection rate was 4.4%, and rescreening on readmission was warranted. Eight youth who were released without treatment were not treated elsewhere, even though HDHHS staff contacted them; however, 5 of these 8 youth were readmitted to the HCJDC in less than 30 days. As part of the intake procedure, the medical staff now reviews the charts of all readmitted youth to identify those needing treatment.

Youth who “always” used condoms had a somewhat lower prevalence of chlamydial infection, but the difference from inconsistent users was not great enough to justify excluding the “consistent” users from testing. This is comparable with findings in other recent studies<sup>6,8,10,13,17</sup> and casts doubt on the value of this variable in differentiating between high-risk and low-risk groups for chlamydial infection and other STDs. This finding also raises concerns about the use of self-reported consistency of condom use in assessing the success of intervention programs to decrease the risk of STDs.

How do our data extend knowledge about the epidemiology of chlamydial infection? They confirm the findings of Oh and her colleagues<sup>2</sup> that incarcerated youth are at high risk of chlamydial infection that is usually asymptomatic; the prevalences of disease in their study and in the present study are among the highest reported for adolescents.<sup>6–15</sup> Our study provided additional information about risk versus age and race or ethnicity. Other studies do not report prevalence by gender<sup>7</sup> or by race or ethnicity.<sup>8–12,15</sup> Some of these primarily involve black subjects<sup>10,11</sup> or blacks and whites.<sup>2,8,9</sup> This is one of the relatively few studies of prevalence in males.<sup>2,11,12,14</sup> We found that black and Hispanic males 14 years or older had clinically significant risk of infection, as did black, Hispanic, and white females throughout our age range of 11 to 17 years (Table 1). The detention center was an ideal place to identify asymptomatic males; high-risk males are a harder group to reach than females, who can also be identified during medical visits for family planning or prenatal care.

In conclusion, our initial data indicated that a screening program for chlamydial infection in incarcerated youth was needed and was practical. In collaboration with the HDHHS, we instituted a permanent screening program that was performing well when reassessed 6 months later.

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