HHS Public Access

Author manuscript

J Correct Health Care. Author manuscript; available in PMC 2019 December 04.

Published in final edited form as:

J Correct Health Care. 2016 January ; 22(1): 21–27. doi:10.1177/1078345815618185.

Chlamydia Screening in Juvenile Corrections: Even Females Considered to Be at Low Risk Are at High Risk

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Abstract

The Centers for Disease Control and Prevention recommends chlamydia screening at intake for all females in juvenile detention facilities. Identifying factors predictive of chlamydia could enable targeted screening, reducing costs while still identifying most infections. This study used demographic, arrest, and health data to identify factors associated with chlamydia among females aged 12 to 18 years entering a juvenile detention facility in San Diego during January 2009 to June 2010. The study created different screening criteria based on combinations of factors associated with infection and calculated sensitivity and proportion screened for each criterion. Overall chlamydia prevalence was 10.3% and was 4.2% among females reporting no sexual risk factors. No acceptable targeted screening approach was identified. High prevalence, even among females without risk factors, supports universal screening at intake.

Keywords

chlamydia; screening; correctional health; juvenile detention

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The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Declaration of Conflicting Interests

The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: The authors disclosed no conflicts of interest with respect to the research, authorship, or publication of this article. For information about *JCHC*'s disclosure policy, please see the Self-Study Exam.

Introduction

Chlamydia (caused by *Chlamydia trachomatis*) is a common sexually transmitted disease (STD) that can cause adverse reproductive health outcomes in women, including pelvic inflammatory disease, leading to infertility and ectopic pregnancy (Stamm, 2007). Chlamydia is most common among young women (Torrone, Papp, & Weinstock, 2014) and is usually asymptomatic (Farley, Cohen, & Elkins, 2003). Consequently, the Centers for Disease Control and Prevention (CDC) recommends that all sexually active women aged 24 or younger be screened annually for chlamydia (Workowski, Bolan, & CDC, 2015). Chlamydia prevalence is high among incarcerated populations (Joesoef et al., 2009; Kouyoumdjian, Leto, John, Henein, & Bondy, 2012), including female entrants to juvenile correctional facilities (Joesoef et al., 2009). Therefore, the CDC recommends universal chlamydia screening for all females aged ≤ 35 years at intake to correctional facilities (Workowski, et al., 2015).

In San Diego County, California, current juvenile detention facility policy is to screen all females entering the facility for chlamydia using a urine-based, nucleic acid amplification test within 6 hours, with laboratory costs borne by the county through state prevention funds. Since 2003, the majority (>92% annually) of female entrants to the facility have been screened due to strong collaboration between the statewide Chlamydia Screening Project (ClaSP) and the local county probation department and their continual quality improvement efforts (Miller, Samoff, Bolan, & ClaSP, 2009). A review of ClaSP data for San Diego's main juvenile detention facility documented high positivity (averaging 12% for chlamydia during 2003 to 2012 among those screened), suggesting the need to continue routine universal screening at the facility. However, periodically reviewing program implementation and outcomes can identify potential cost-reducing strategies. Identifying factors predictive of chlamydial infection among female entrants to juvenile detention facilities could theoretically allow for targeted screening, reducing costs while still identifying almost all infections.

Identifying effective screening criteria from ongoing screening program data can be problematic because data are usually biased by inadequate screening coverage (e.g., only females at highest risk are screened, and positivity therefore does not estimate prevalence in the entrant population overall). Additionally, analyses are often limited by lack of relevant data available (e.g., factors most predictive for chlamydial infection are not routinely collected). However, the San Diego juvenile detention facility had high documented screening coverage and the facility completes a sexual risk assessment, which includes risk factors for chlamydia, for every individual booked into the facility. Therefore, the San Diego juvenile detention facility provided an ideal setting to investigate whether chlamydia screening can be targeted in this type of facility.

Methods

Facility and public health laboratory records were received for all females aged 12 to 18 years entering the San Diego juvenile detention facility during January 2009 to June 2010. The facility serves as the main booking location for all juvenile detention facilities in the

county. The screening coverage was calculated by determining the proportion of intakes in which the entering female was screened for chlamydia. Chlamydia prevalence was estimated by dividing the number of positive test results by the number of chlamydia tests done. To examine the factors associated with chlamydial infection, demographic, arrest, and health data were abstracted from the juvenile detention facility's paper records. Data were abstracted on all intakes in which the female tested positive for chlamydia along with a random sample of 10% of intakes in which the female tested negative. Some females had multiple intakes during the study period and sampling was based on intakes rather than females. During November 2010 to July 2011, five trained abstractors from the HIV, STD, and hepatitis branch of the Public Health Services Division of the County of San Diego Health and Human Services Agency reviewed the selected records and entered abstracted data directly into an EpiInfo® database.

Factors known to be associated with STDs (e.g., sexual behaviors) and factors hypothesized to be associated with or predictive of chlamydial infection in a detention setting (e.g., reason for arrest) were abstracted. The current intake flow at the facility was examined and abstraction was restricted to data collected prior to chlamydia screening (e.g., length of stay in facility or outcome of arrest was not examined) so that any identified factors could be used to make a screening decision at the time of intake. Demographic factors abstracted were race, age, and whether the female was from a group home. Health-related data were abstracted from the assessment form completed by a nurse during the intake health exam and from laboratory records from previous intakes at the facility (if available in the chart). Health-related factors abstracted were whether the female was currently sexually active or currently using birth control, demonstrated prior chlamydia test result in facility record, and sexual risk factors. Sexual risk factors were based on self-reported answers to eight questions administered by a nurse: diagnosis of an STD in the past 6 months, contact with a person with an STD in the last 3 months, recent symptoms (e.g., discharge, dysuria, ulcer, rash), two or more sex partners in the last 3 months, and work as, or had sex with, a prostitute in the past 6 months. Arrest-related factors abstracted were arrest for drug use, sex work, or felony. Additionally, we considered charge code (e.g., specific offense related to the intake), gang affiliation, and zip code as possible factors associated with chlamydial infection. However, most records were missing this information or there was incomplete information at time of intake, so these variables were not included in the analysis.

Bivariate associations were calculated between abstracted factors and prevalent chlamydial infection using logistic regression with generalized estimating equations to account for multiple intakes among females (Kleinbaum, 2002). Different screening criteria, based on combinations of factors associated with infection in bivariate analysis, were created. Given the small sample size, a conservative of 0.10 to reduce Type II error was chosen. Screening criteria performance was assessed by considering the proportion of infections detected (i.e., sensitivity of the criteria) and the proportion of females that would be screened (i.e., efficiency of the criteria). All analyses were weighted to account for the sampling of intakes where the female tested negative for chlamydia and were conducted in SAS v.9.2 (Cary, North Carolina). Because this analysis was undertaken as a quality improvement activity by the juvenile detention facility in order to improve clinical practice, institutional review board

approval was not needed (U.S. Department of Health and Human Services [USDHHS], n.d.).

Results

During January 2009 to June 2010, there were 1,890 female intakes at the San Diego juvenile detention facility. A chlamydia test was performed for 1,771 of these intakes, representing a screening coverage of 93.7%. Overall, 10.3% ($n = 183$) of chlamydia tests were positive. Of the 183 positive tests, 163 (89.1%) intake records were available for review and were abstracted. Of the 1,588 negative tests at intake during the study period, 178 intake records were randomly selected. Of those, 168 (94.4%) were available for review and were abstracted, representing a sample of 10.5% of all negative tests performed during the study period. The 331 reviewed intakes (163 chlamydia positive and 168 chlamydia negative) represented 294 females; 33 females had multiple intakes during the study period (5 females had three intakes and 27 females had two intakes).

Chlamydia prevalence varied by demographics, arrest, and health behaviors (Table 1). Prevalence was higher among females aged 15 to 18 years (11.1%) compared with those aged 12 to 14 years (4.3%; $p < .10$). Almost a third of females arrested for sex work (30.8%) had a prevalent chlamydial infection at intake. Sexually active females were more likely to have a prevalent infection at intake compared to females denying sexual activity (11.6% vs. 4.2%; $p < .10$). Chlamydia prevalence was also higher among females reporting at least one STD risk factor (e.g., multiple sex partners) compared with females reporting no STD risk factors (23.2% vs. 7.0%; $p < .10$). Chlamydia prevalence was highest among females who had a documented prior chlamydial infection in their record at the juvenile detention facility at 34.6%. Chlamydia prevalence was 11.6% among African American females and 8.2% among non-African American females, but the difference was not statistically significant ($p > .10$).

Various screening criteria were created using combinations of the five variables associated with chlamydial infection in bivariate analysis (i.e., age, arrest for sex work, sexually active, STD risk factor, and prior positive chlamydia test in record). The most selective criteria would be to only screen females with all five predictive characteristics (i.e., sexually active, older, arrested for sex work, reported at least one STD risk factor, and had a prior positive chlamydia test in her record). The least selective criteria based on identified predictors would be to screen females who had at least one of the five markers (i.e., older age or arrest for sex work or sexually active or STD risk factor or prior positive chlamydia test in record). Criteria in between were composed of a combination of one to five of the predictive characteristics (e.g., screening only sexually active older females). Many combinations had high efficiency but low sensitivity. For example, if the facility only screened intakes where the arrest was related to sex work or there was a prior chlamydial infection documented in the record, then only 7% of intakes would require screening (i.e., high efficiency). However, using these criteria, only 25% of prevalent infections would be identified (i.e., poor sensitivity). To find 85% of all infections using combinations of factors associated with chlamydia, we would need to screen more than 70% of intakes. For example, screening all

sexually active females as well as females aged 15 years or older would identify almost all infections (95%) but would require screening at 87% of intakes.

Discussion

Reducing the proportion of adolescents and young adults with chlamydia is a Healthy People 2020 goal (USDHHS, 2014). Although increasing screening coverage is a primary chlamydia control strategy (Martin, 2012), periodic review of prevention efforts can help ensure limited resources are allocated appropriately. Using data abstracted from existing facility records, we demonstrate that in a juvenile detention facility in San Diego, a targeted screening approach—one that reduced numbers of females screened at intake while still capturing most chlamydia cases—could not be identified.

The San Diego facility screened young females for chlamydia at more than 94% of all intakes, demonstrating that high screening coverage in juvenile correctional facilities is feasible. This is substantially higher than the screening coverage reported in a sample of juvenile detention facilities nationally (average of 58% screening coverage in 2008; Peterman, Newman, Collins, Doshi, & Berman, 2011). It is also higher than chlamydia screening coverage of female adolescents in federally funded family planning clinics (57.7% screened in 2011; Fowler, Lloyd, Gable, Wang, & McClure, 2012) or sexually active young women aged 16 to 20 years accessing care in managed care organizations (54.9% screened in Medicaid settings in 2011; National Committee for Quality Assurance, 2012). The screening coverage in the San Diego facility is similar to coverage among entrants to the National Job Training Program, a vocational program for socioeconomically disadvantaged youth (94% screened in 2008; Satterwhite, Tian, Braxton, & Weinstock, 2010).

The overall observed chlamydia prevalence of 10.3% in the facility is higher than the prevalence in the general population of adolescent females (estimated to be ~4% in 2007 to 2008; Datta et al., 2012) and similar to the prevalence among young women entering the National Job Training Program (11.4% in 2010; CDC, 2011). Prevalence in the San Diego facility was lower than morbidity reported in other juvenile correctional facilities in 2010 (median facility-specific positivity was 14.5%; CDC, 2011). However, other juvenile correctional facilities may have targeted screening practices (e.g., only testing symptomatic females), resulting in higher positivity.

Targeting chlamydia screening could theoretically reduce program costs by only testing those females most likely to be infected. Based on an in-depth chart abstraction, we were not able to identify a combination of routinely collected characteristics that was both sensitive and efficient; no screening criteria could identify more than 85% of infections without requiring screening of more than 70% of intakes. Even among females reporting no sexual activity, prevalence of chlamydia was 4.2%, surpassing the usual cut point of 3% prevalence for screening cost-effectiveness (Marrazzo et al., 1997). It is possible that there is a combination of factors that could be used to effectively target screening in the facility but that those factors are not routinely collected.

This programmatic review was subject to at least four limitations. By selecting a juvenile detention facility with high screening coverage, we increased the probability that positivity among those screened estimated prevalence in the entrant population, increasing the applicability of our screening criteria. However, screening was not conducted on 6% of intakes to the facility. If all of the females not screened were negative, the overall chlamydia prevalence would have been 9.6% (183/1,890); if all were positive, the prevalence would have been 15.9% (302/1,890). The true prevalence is between those two points. Second, some charts selected for review were not available during the abstraction period. It is possible that these missing data may have biased the findings if they were not missing at random. Unfortunately, reasons why the charts were not available were not known nor could comparisons be drawn among those females with and without available charts. Hence, it was assumed the charts were missing at random. However, as more than 90% of total charts selected for review were available, the effect of missing data should be minimal. Third, the "sexually active" variable did not capture sexual activity within a specific time period. It is possible that a more nuanced question (e.g., "have you had sex in the last month") would be a stronger predictor of chlamydial infection. Finally, these findings may not be generalizable to all juvenile detention facilities. However, this assessment was conducted using routinely collected data in the facility. Local and regional facilities could conduct their own analysis to see if facility-relevant screening criteria could be identified.

Chlamydial infections can cause lifelong, reproductive health consequences, and identifying and treating infections in young women is a public health priority. Young females entering detention facilities are at increased risk for chlamydial infection and are often disenfranchised from routine health care (Spaulding et al., 2013). Screening upon intake to a detention facility offers an opportunity to reduce adverse sequelae in a vulnerable, at-risk population. Our findings support the current recommendation of screening of all young females at intake to correctional facilities.

Acknowledgments

We would like to thank Bruce Furness, Dr. Alicia Cantu (associate clinic professor of pediatrics, University of San Diego, California, and medical director of San Diego County Juvenile Hall), County of San Diego Probation Department, and California Forensic Medical Group.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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Table 1.

Associations Between Demographic, Arrest, and Health-Related Factors and Prevalent Chlamydial Infection Among Females Aged 12 to 18 Years Screened at Intake to Juvenile Detention Facility, San Diego, California, January 2009 to June 2010.

	Weighted Total[a]	No. With Chlamydial Infection (*n* = 163)	Percentage With Chlamydial Infection
Demographics			
Race			
African American	524	61	11.6
Non-African American	1,214	99	8.2
Age (years)			
12–14	444	19	4.3**
15–18	1,265	140	11.1
From a group home			
Yes	135	12	8.9
No	1,554	146	9.4
Arrest data			
Arrest for drugs			
Yes	108	13	12.1
No	1,620	145	9.0
Arrest for sex work			
Yes	68	21	30.8
No	1,659	137	8.3
Felony arrest			
Yes	624	57	9.1
No	1,102	100	9.1
Health behaviors			
Sexually active			
Yes	1,177	137	11.6**
No	543	23	4.2
No. of STD risk factors[b]			
≥1	246	57	23.2**
0	1,505	106	7.0
Currently using birth control			
Yes	276	30	10.9
No	1,444	130	9.0
Prior chlamydia test at facility			
Positive prior test	72	25	34.6**
No or negative prior test	1,679	138	8.2

Note. STD = sexually transmitted disease.

[a]Weighted to reflect all females tested in facility during study period (*N* = 1,771), which may not add to total due to missing data.

[b] Based on self-reported answers to eight questions: diagnosed with STD (last 6 months), traded sex (last 6 months), contact to STD (last 3 months), multiple sex partners (last 3 months), or recent signs or symptoms of STDs.

[**] p for difference in percentage with chlamydial infection < .10.