Disentangling Screening and Diagnostic Chlamydia Test Positivity Among Females Testing at Title X-Funded and Adolescent Health Clinics, San Francisco 2009

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Abstract: By using a reason-for-test code, we compared positivity for female chlamydia and gonorrhea. At family planning clinics, there were no statistically significant differences in screening versus diagnostic positivity for either chlamydia or gonorrhea among women. However, at adolescent health clinics, diagnostic positivity was higher than screening positivity for chlamydia and gonorrhea.

Key Words: chlamydia, gonorrhea, screening, positivity.

Chlamydia is the most common reportable infection in the United States; in 2008, more than 1.2 million cases of chlamydia were reported nationally.[1] Based on the review of local data, the San Francisco Department of Public Health has developed chlamydia screening guidelines that recommend annual screening for females aged 25 years or younger, pregnant females, and females having an intrauterine device (IUD) insertion.[2] Additionally, guidelines state that all women infected with either *Chlamydia trachomatis* or *Neisseria gonorrhoeae* be retested in 3 months.[2] Females presenting with urogenital symptoms or who report being informed by a sex partner that they have been exposed to chlamydia should also be tested.[2] San Francisco's guidelines largely follow national recommendations.[3]

In the United States, chlamydia testing in females is supported by the Centers for Disease Control and Prevention through its Infertility Prevention Project (IPP) in a variety of clinical settings.[4] Although improved chlamydia screening coverage for females under the age of 26 years is a primary objective of IPP, screening sites are encouraged to monitor whether chlamydia positivity in participating IPP sites is at least 3%, the accepted threshold for cost-effective female chlamydia screening.[5]

Monitoring effective use of IPP resources is difficult due to often-missing data regarding the reason for testing. Most project areas do not capture whether the chlamydia test was performed for diagnostic reasons (the female patient had symptoms, was a contact, or had a prior infection) or screening. As a result, overall chlamydia positivity is used as a surrogate for screening positivity. These limitations leave several unanswered questions regarding the usefulness of screening guidelines and the diagnostic criteria for chlamydia testing.

In an effort to help disentangle diagnostic and screening positivity, the San Francisco Department of Public Health modified its procedures for processing chlamydia and gonorrhea testing in the San Francisco Public Health laboratory (PHL). These changes were implemented on January 1, 2009, and affected all community-based screening sites that use the PHL for sexually transmitted disease (STD) testing. Providers were required to complete a "reason for test" section on the laboratory requisition form when submitting specimens to the public health laboratories for testing; the catchall "Other" reason for test category was removed from the requisition form. Only specimens with a reason for test indicated on the form would be processed by the PHL. The available reasons for testing for female patients included the following: females aged 25 years or younger, pregnancy (first and third trimester), IUD insertion, prior chlamydial or gonococcal infection, contact to STD, or diagnostic/symptomatic. If both a screening and diagnostic reason for test were included on the laboratory requisition form, the diagnostic reason was used. Additionally, "reason for test" was electronically captured by PHL staff at the time the specimen was processed.

In this analysis, we looked at overall female positivity from 2 categories of providers, Title X-funded family planning sites and adolescent health clinics. These providers test the largest amount of females among the participants in the San Francisco STD Section's Screening Program, and use the PHL for all STD testing. All gonorrhea and chlamydia nucleic acid amplification tests for females of at least 12 years of age with cervical, vaginal, or urine specimen sources from January 1, 2009 through March 31, 2010 from 8 Title X-funded family planning clinics and 5 adolescent health clinics that are part of San Francisco's community health network screening program were included in this analysis. All specimens from these sites were tested using GenProbe APTIMA Combo2 (San Diego, CA). We compared overall positivity among adolescent health provider and family planning sites by the reasons for test. Positivity was defined as the proportion of positive tests of those submitted to the PHL. We additionally compared positivity for diagnostic versus screening reasons for test for both adolescent and family planning sites. Diagnostic reasons included the patient presenting with symptoms associated with chlamydia and gonorrhea as well as the patient being a contact to an STD or having a prior infection of chlamydia or gonorrhea. Screening reasons included 25 years and younger age, insertion of IUD, and pregnancy. Pearson χ^2 and Fisher exact

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TABLE 1. Number of Women Tested for Chlamydia by Reason for Visit and Provider Sites in San Francisco, January 1, 2009 to March 31, 2010

Reason for Test	Family Planning n (%)	Adolescent Health n (%)	Total n (%)
Diagnostic			
Symptomatic	1702 (41.22)	470 (11.74)	2172 (26.70)
Contact	297 (7.19)	66 (1.65)	363 (4.46)
Prior infection	231 (5.59)	173 (4.32)	404 (4.97)
Screening			
Age <25	1267 (30.69)	3252 (81.20)	4519 (55.56)
Pregnant	429 (10.39)	42 (1.05)	471 (5.79)
IUD	203 (4.92)	2 (0.05)	205 (2.52)
Total	4129	4005	8134

IUD indicates intrauterine device.

tests were used to assess significance. All analyses were done using SAS version 9.2 (SAS Institute Inc, Cary, NC). As these were de-identified surveillance data used for public health purposes, this study was considered exempt from human subjects considerations in accordance with the Code of Federal Regulations, Title 45.

At family planning clinics, the median age of women tested was 27 years (range, 12–69 years). At adolescent health clinics, the median age of women tested was 18 years (range, 12–41 years). Approximately 39% of women tested at adolescent health clinics were black, 23% Hispanic, 21% Asian/Pacific Islander, and 15% white. At family planning clinics, approximately 35% of women were black, 29% Hispanic, 19% Asian Pacific Islander, and 15% white. Of note, these represent tests, not individuals; individuals could be tested multiple times during the analysis time frame.

Throughout the study period, there were 2156 and 2013 female chlamydia tests for family planning and adolescent health clinics, respectively, processed by the PHL with a valid reason for test (Table 1). Among the tests processed for family planning clinics, 1003 (46.5%) were for screening and 1153 (53.5%) were for diagnostic reasons. Among chlamydia tests processed for adolescent health sites, 1658 (82.4%) were for screening and 355 (17.6%) were for diagnostic reasons. Overall positivity for chlamydia was 4.6% at family planning sites and 8.5% at adolescent health sites. At family planning clinics, positivity was 4.7% for screening reasons and 4.5% for diagnostic reasons (Fig. 1). Among adolescent health providers, positivity was 7.5% for screening and 12.7% for diagnostic reasons (Fig. 1). There was no statistically significant difference in screening versus diagnostic positivity at family planning clinics ($P = 0.846$). However, at adolescent health clinics, diagnostic positivity was significantly higher than screening positivity ($P = 0.0016$). Additionally, when restricted to only patients aged 25 years or younger, there was no significant difference in positivity in adolescent versus family planning sites (8.5% vs. 6.7%, $P = 0.097$). However, among women being screened, females aged 25 years or younger at adolescent health centers had a significantly higher positivity rate than females aged 25 years or younger at family planning clinics (7.6% vs. 5.1%, $P = 0.023$). There was no statistically significant difference by diagnostic reasons for test in adolescent versus family planning clinics among females aged 25 years or younger (12.8% vs. 13.0%, $P = 0.946$).

During the same period, there were 1973 and 1992 tests for gonorrhea processed by the PHL for family planning and adolescent health clinics, respectively. Of the tests for family planning sites, 896 (45.4%) were for screening and 1077 (54.6%) were for diagnostic reasons. At adolescent health sites, 1638 (82.2%) requested tests were for screening and 354 (17.8%) tests were for diagnostic reasons. For gonorrhea, overall positivity at family planning sites was 0.7%; for adolescent health sites, overall positivity was 1.4%. Among gonorrhea tests requested by family planning sites, positivity was 0.9% for screening and 0.6% for diagnostic reasons (Fig. 2). Among gonorrhea tests requested by adolescent health sites, positivity was 1.0% for screening and 3.4% for diagnostic reasons (Fig. 2). The difference in gonorrhea positivity for screening versus diagnostic reasons at family planning sites was not statistically significant ($P = 0.376$). However, similar to chlamydia posi-

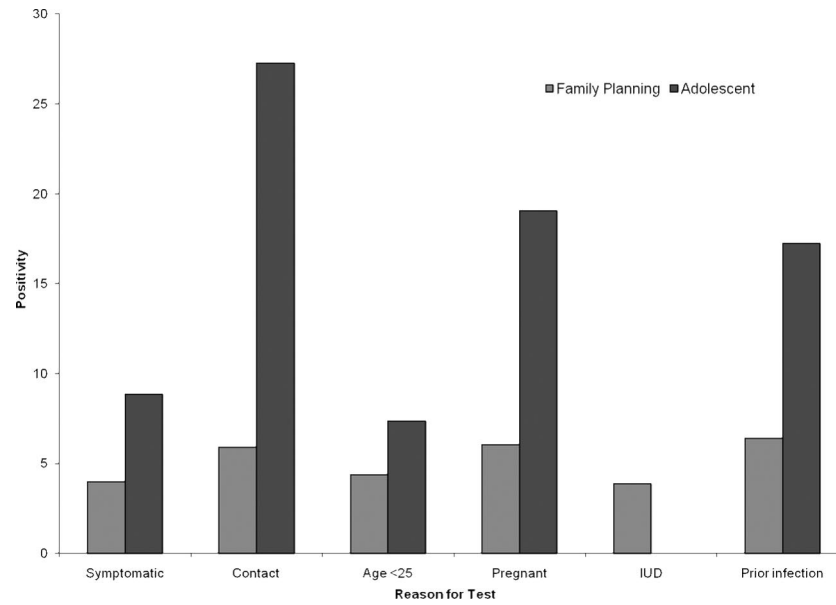

Figure 1. Positivity of chlamydia tests among provider sites in San Francisco, January 1, 2009 to March 31, 2010. IUD indicates intrauterine device.

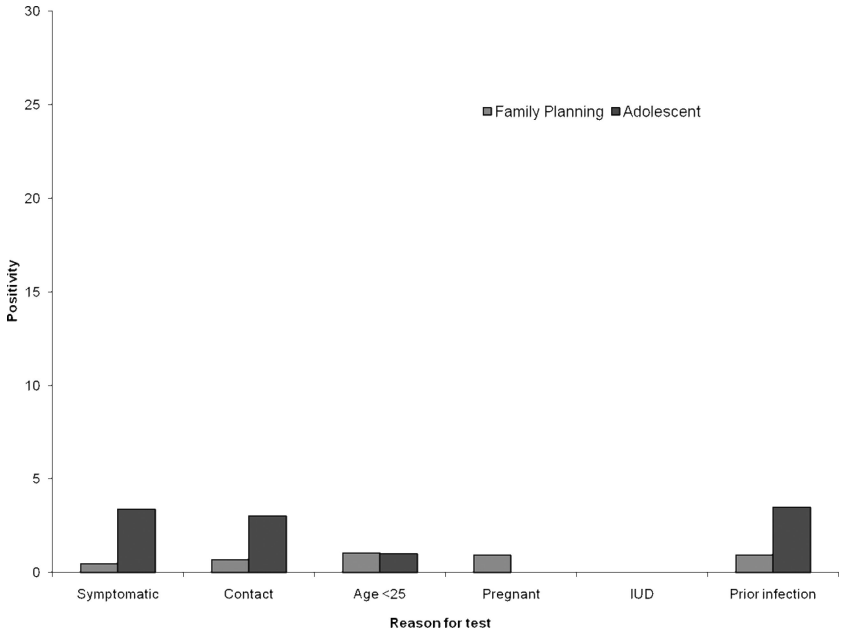

Figure 2. Positivity of gonorrhea tests among provider sites in San Francisco, January 1, 2009 to March 31, 2010. IUD indicates intrauterine device.

tivity at adolescent health sites, the diagnostic positivity was significantly higher than the screening positivity ($P = 0.002$). Additionally, when restricted to only patients aged 25 years or younger, there was no significant difference in positivity in adolescent versus family planning sites (1.4% vs. 1.2%, $P = 0.570$). There was no statistically significant difference by screening or diagnostic reasons for test in adolescent versus family planning clinics.

Before the changes in the laboratory requisition form, data on diagnostic versus screening positivity were unavailable, because ordering providers did not always mark a reason for testing and the reason for test data were not being entered into the laboratory computerized processing system. As a result, monitoring and evaluating local chlamydia screening programs has been challenging. Although it was expected that positivity for chlamydia and gonorrhea would be higher for diagnostic reasons, significant differences in positivity were seen at adolescent health but not at family planning sites. The similarity of positivity among diagnostic and screening reasons for tests may be indicative of the asymptomatic nature of chlamydia in females; chlamydia can be asymptomatic in up to 75% of women.[6] Additionally, symptoms for female chlamydial and gonococcal infections are fairly nonspecific and may be attributable to other lower genital tract infections.[7] These findings also suggest that the diagnostic criteria for chlamydia may not be as appropriate as with other, more symptomatic conditions. Furthermore, as shown in our data, being a contact to disease appears to be the strongest indicator of infection.

Overall, positivity was also significantly higher in adolescent health clinics compared with the family planning sites. The higher positivity among adolescent health providers is not surprising given that higher rates of female chlamydia and gonorrhea are seen among adolescents.[8] The higher rates among adolescents were the basis for the chlamydia screening recommendations set forth by the Centers for Disease Prevention and Control and US Preventive Services Task Force.[9,10]

There are some limitations to this analysis. First, San Francisco is a unique, urban environment and the results from our analysis may not be able to generalize to other settings. Additionally, the proportion of diagnostic versus screening tests, as well as reason for test codes, will vary in different settings. Furthermore, the reason for test codes were not validated through medical chart review at the adolescent health or primary care sites. Nevertheless, the reason for test coding system is a valuable tool for understanding positivity of STDs within a jurisdiction. The ability to parse out screening versus diagnostic testing is an important tool in the evaluation of chlamydia screening programs.

Measuring progress toward reducing STD-related infertility is reliant on program monitoring and evaluation. In San Francisco, like many local health jurisdictions in the United States, the ability to effectively dedicate infertility prevention resources in the most cost-efficient manner is hindered by incomplete data on the reason for chlamydia testing among females. We found that chlamydia positivity varied by reason for test as well as clinical setting (family planning vs. adolescent health clinics). The addition of data on reason for test now allows us to focus efforts on monitoring "true screening" positivity at clinical sites participating in IPP. These routinely collected data can now be used to identify screening sites not meeting targets and furthermore allow programs to better focus on screening, which was not feasible with old data because it was impossible to distinguish diagnostic testing. These more refined data may prove critical in directing resources to patient populations with the highest likelihood of screening positive for chlamydia or gonorrhea.

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