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The Impact of Automated Testing for Syphilis Diagnosis on Surveillance – Connecticut, 2010

Syphilis is a sexually transmitted disease caused by the spirochete *Treponema pallidum*. It is both laboratory and physician reportable in the state of Connecticut. In 2010, 96 cases of primary and secondary syphilis were reported to the Department of Public Health (DPH), a 182% increase from 2008.

Because *T. pallidum* cannot be cultured and direct detection of the spirochete is difficult, laboratory diagnosis is typically dependent on 2 serologic tests. The Centers for Disease Control and Prevention (CDC) recommends using a non-specific test that detects antibodies formed in response to damaged host cells for screening. Positive tests should then be confirmed with a test that detects antibodies to *T. pallidum*. These treponemal tests are more specific but cannot distinguish between active and past infection, and are typically manual tests. The diagnostic algorithm when following these recommendations is straightforward (Figure 1-1A).

In recent years, due to economic reasons, some laboratories have begun using automated, treponemal tests, such as enzyme immunoassays (EIAs) and chemiluminescence immunoassays (CIAs), to screen for syphilis. Positive sera are then tested with a non-specific test to confirm active syphilis infection. This practice, called reverse sequence screening, might complicate diagnosis by producing discordant results that would not have resulted under the previous algorithm. These results have 3 possible explanations: 1) a false-positive EIA/CIA, 2) previously treated syphilis, or 3) early primary syphilis (i.e. the patient has yet to develop non-treponemal antibodies). Therefore, clinical management of patients evaluated with automated tests can be difficult. The CDC recommends that an additional treponemal test result and knowledge of the patient's clinical history be used to diagnose these cases (Figure 1-1B).

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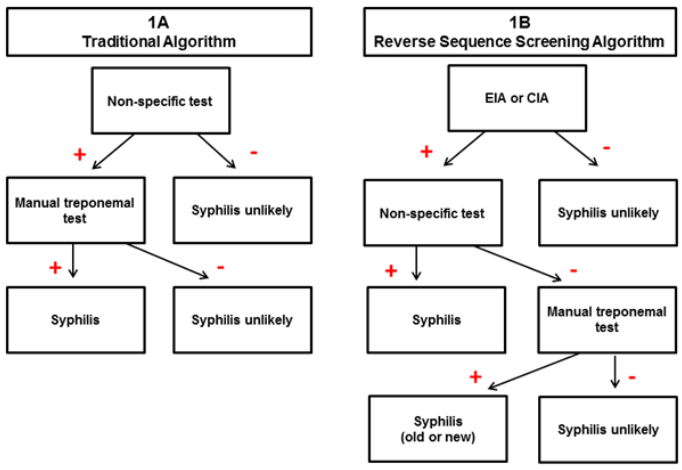
Knowledge of how automated treponemal tests are being used and reported in Connecticut is essential for identifying infectious cases, collecting accurate surveillance data, and providing guidance to clinicians. In September 2011, the DPH conducted a laboratory survey of 27 major hospital laboratories, 2 commercial laboratories, and the DPH laboratory to determine the type of syphilis testing performed and reported, as well as the volume of syphilis testing performed in 2010.

Of the 30 laboratories surveyed, 28 (93%) performed syphilis testing on-site. Of these, 4 (14%) used automated testing and the reverse sequence screening algorithm, and included 1 high-volume commercial laboratory. Testing algorithms were not consistent among these laboratories. The remaining 24 laboratories did not use automated tests; 23 used the traditional diagnostic algorithm. Of the 24 laboratories, 15 (63%) referred samples to other laboratories for treponemal testing.

Figure 1. CDC recommended syphilis diagnostic algorithms.



Of the 28 laboratories that performed testing, 24 (86%) reported positive results within the state-mandated 48 hours but only 14 (50%) reported using both of the 2 tests needed to diagnose syphilis (non-specific and treponemal). The majority of laboratories did not identify any barriers that inhibited them from reporting, other than time.

Of the laboratories that performed testing, 24 (86%) were able to estimate how many syphilis screening tests they performed in 2010. The total estimated number of screening tests performed by these labs in 2010 was 196,700; 233 confirmed cases of early and latent syphilis were reported to DPH in that same year.

Reported by

K. Bemis, MPH, CDC/CSTE Applied Epidemiology Program; M. Lobato, MD, Division of Tuberculosis Elimination, CDC; H. Jenkins, BS, L. Sosa, MD, Infectious Diseases Section, Connecticut Department of Public Health

Editorial

Uptake of automated treponemal testing in Connecticut is moderate, but increasing. At least one laboratory indicated it might adopt automated testing in the next year, while another reported it will begin sending its samples to a reference laboratory that performs automated testing. As the use of automated testing increases so will the proportion of patients identified with discordant results. In a CDC study of 4,834 sera positive by EIA or CIA, 56.7% were negative when tested with a non-specific test; 31.6% of these samples were also negative when tested with a traditional, manual treponemal test, suggesting a large proportion of false positive EIA/CIAs (1). Determining whether discordant results meet the syphilis surveillance case definition or merit investigation by the health department will increase the DPH staff workload. The high ratio of tests to reported cases, inconsistent reporting among laboratories, and varying testing algorithms among laboratories will also contribute to the increased burden on DPH. In this setting, it is imperative that health department staff establish standard procedures for monitoring, interpreting, and documenting reported syphilis tests.

Clinicians and other health professionals evaluating patients with discordant syphilis results should ensure a third treponemal test is performed before making a definitive diagnosis. In the absence of a treatment history, patients with a positive third test should be presumed to have syphilis. If the test is negative, syphilis is unlikely. However, the clinician should take into account the patient's risk factors and exposure history, and treat or re-test as necessary. Physicians who diagnose syphilis should report these patients to the DPH.

Laboratories should report patients with positive results on either non-specific tests or manual treponemal tests. Positive results on specimens referred to other laboratories should be reported by the laboratory that originally received the specimen. The health department will follow-up on all reported cases to determine diagnosis, and offer partner notification services to those infected for less than one year. Healthcare providers should inform their patients about the DPH's confidential partner notification activities and their benefits. Providers can contact the STD Control Program with questions regarding interpretation of automated tests or requests for partner notification services and materials by calling (860) 509-7920.

References

1. Centers for Disease Control and Prevention. Discordant Results from Reverse Sequence Syphilis Screening – Five Laboratories, United States, 2006 – 2010. MMWR, 2011; 60 (05); 133-137.

Risk Factors for Gonorrhea and Chlamydia Co-infection, New Haven and Hartford Counties — Connecticut, 2009−2011

Gonorrhea is one of the most commonly reported sexually transmitted diseases (STD). Many gonorrhea cases involve co-infection with chlamydia. The purpose of this analysis was to determine factors associated with gonorrhea and chlamydia co-infection in Connecticut.

Since 2009, the Connecticut Department of Public Health (DPH) STD Control Program has participated in the Centers for Disease Control and Prevention (CDC) STD Surveillance Network (SSuN), a sentinel surveillance system that follows a

common protocol of collecting additional data on STD risk factors. As part of this project, a random sample of newly diagnosed gonorrhea case-patients from Hartford and New Haven counties are interviewed monthly to determine demographic information of sex partners, and behavioral risk factors. Data for this analysis were obtained from Connecticut SSuN interviews, and the Connecticut STD Control Program database.

Between July 1, 2009–June 30, 2011, 397/826 (48.1%) randomly selected gonorrhea case-patients from New Haven and Hartford counties were successfully interviewed. Among interviewed case-patients, 386 (97%) had information on chlamydia co-infection; of these, 28.8% (111/386) were co-infected with chlamydia. In a comparison of case-patients with gonorrhea only and gonorrhea and chlamydia co-infection (Table 1), non-Hispanic black race, Hispanic ethnicity, history of gonorrhea infection in the past 12 months, not using a condom at last sexual encounter and residence in Hartford County were significantly associated with co-infection. In a multivariate model, non-Hispanic black race (Odds Ratio, 4.80 [95% Confidence Interval, 1.62–20.63]), Hispanic ethnicity (OR, 4.30 [95%CI, 1.33–19.31]), history of gonorrhea infection in the past 12 months (OR, 3.38 [95%CI, 1.29–9.20]), not using a condom at last sexual encounter (OR, 1.84 [95%CI, 1.10-3.12]) and residence in Hartford County (OR, 1.90 [95%CI, 1.15–3.17]) were still significantly associated with co-infection. In the model, younger age, (15–29 years old) (OR, 1.91 [95% CI, 1.01–3.82]) was also associated with co-infection. Not using a condom at last sexual encounter was the only behavioral risk factor associated with a co-infection diagnosis.

Reported by

M. Mohamed, MPH, MA; H. Jenkins, BS; L. Sosa, MD,
Infectious Diseases Section, STD Control Program,
Connecticut Department of Public Health.

Editorial

Almost one-third of gonorrhea case-patients interviewed from these 2 counties were co-infected with chlamydia and a significant proportion of these infections occurred among black and Hispanic populations residing in Hartford County. Not using a condom was associated with an increased risk of chlamydia co-infection. While there are few studies looking at risk factors for gonorrhea and chlamydia co-infection, this analysis supports a previous study which showed younger persons and African-Americans to be more affected by co-infection (*1*). Importantly, a history of gonorrhea infection being associated with co-infection also indicates the importance of rescreening persons with gonorrhea infection. As recommended by the CDC, rescreening should occur 3–12 months after identification of the initial infection to detect reinfection (*2*).

There are some limitations to this analysis. First, while case-patients were randomly selected for interviews, interview success rates have been low (48%). Case-patients interviewed might not be representative of all persons with gonorrhea. Second, data from interviews were based on case-patient self-report and some case-patients might not answer questions related to behavioral risks truthfully or accurately.

After several years of steady decline, the gonorrhea rate in Connecticut increased by 20% in 2008 (80/100,000). While the rate has since decreased, it remains high compared to the rate of 66.4/100,000 recorded in 2007. Since the DPH STD Control Program identified the increase in gonorrhea infections in 2008, efforts have been made to raise awareness of gonorrhea and the need for testing. Activities have included implementation of focused partner notification activities in areas with high gonorrhea rates and a social marketing campaign. The data presented here will be used to better target partner notification and screening activities that would have the greatest impact on infection rates. For additional information on gonorrhea, gonorrhea and chlamydia co-infection or for assistance with partner notification, please contact the DPH STD Control Program at 860-509-7920.

References

1. R.H. Kahn, D.J. Mosure, S. Blank, C.K. Kent, J.M. Chow, M.R. Boudov, J. Brock, S. Tulloch, Chlamydia trachomatis and Neisseria gonorrhoeae prevalence and coinfection in adolescents entering selected US juvenile detention centers, 1997-2002, Sex Transm Dis, 32 (2005) 255-259.

2. Centers for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines, 2010. MMWR 2010;59(No. RR-12): 52.

Table 1. Comparison between gonorrhea and gonorrhea-chlamydia co-infected cases New Haven and Hartford Counties, Connecticut, July 1, 2009-June 30, 2011

Characteristic	Co-infection (n=111) N (%)	Gonorrhea (n=275) N (%)	Odds ratio (95% confidence Interval)
Sex of cases			
Male	38 (34.23)	101 (36.73)	0.90 (0.57 – 1.42)
Female	72 (65.77)	174 (63.27)	
Sex of partners			
Male	72 (64.86)	183 (66.55)	0.96 (0.60 – 1.55)
Female	36 (32.43)	88 (32.00)	
Age of cases (years)			
15-19	27 (24.32)	56 (20.36)	1.87 (0.91 – 3.82)
20-24	45 (40.54)	99 (36.00)	1.76 (0.92 – 3.38)
25-29	23 (20.72)	58 (21.09)	1.54 (0.74 – 3.20)
30+	16 (14.41)	62 (22.55)	
Age of partners (years)			
15-19	21 (18.92)	42 (15.27)	1.14 (0.58 – 2.25)
20-24	45 (40.54)	100 (36.36)	1.02 (0.59 – 1.80)
25-29	15 (13.51)	67 (24.36)	0.51 (0.25 – 1.04)
30+	29 (26.13)	66 (24.00)	
Race/Ethnicity of cases			
NH Black	70 (63.06)	157 (57.09)	4.01 (1.40 – 11.71)
Hispanic	24 (21.62)	53 (19.27)	4.08 (1.30 – 12.74)
NH White	4 (3.60)	36 (13.09)	
Race/Ethnicity of partners			
NH Black	60 (54.05)	134 (48.73)	1.79 (0.81 – 3.95)
Hispanic	29 (26.13)	83 (30.18)	1.40 (0.60 – 3.25)
NH White	9 (8.11)	36 (13.09)	
Gonorrhea infection in past year			
Yes	11 (9.91)	10 (3.64)	3.04 (1.25 – 7.40)
No	93 (83.78)	257 (93.45)	
Condom use before test			
No	72 (64.86)	151 (54.91)	1.71 (1.05 – 2.78)
Yes	31 (27.93)	111 (40.36)	
County of residence			
Hartford	75 (67.57)	147 (53.45)	1.87 (1.17 – 2.97)
New Haven	35 (31.53)	128 (46.55)	

Jewel Mullen, MD, MPH, MPA
Commissioner of Public Health

Matthew L. Cartter, MD, MPH
State Epidemiologist

Lynn Sosa, MD
Deputy State Epidemiologist

HIV Surveillance 860-509-7900
Epidemiology and Emerging Infections 860-509-7994
Immunizations 860-509-7929
Tuberculosis Control 860-509-7722
Sexually Transmitted Diseases (STD) 860-509-7920

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Editor: Matthew L. Cartter, MD, MPH

Assistant Editor & Producer:
Starr-Hope Ertel