



Published in final edited form as:

Sex Transm Dis. 2025 March 01; 52(3): 154–161. doi:10.1097/OLQ.0000000000002098.

Gonorrhea and early syphilis treatment practices among community healthcare providers in Baltimore City, Maryland

Renee Padiernos, MPH¹, Nicole Thornton, MSPH², Ravikiran Muvva, MBBS, MPH, MPA^{2,3}, Arik V Marcell, MD, MPH^{2,5}, Jacky M Jennings, PhD, MPH^{2,4}, Christina M Schumacher, PhD, MHS²

⁽¹⁾University of California Berkeley School of Public Health, Berkeley, CA

⁽²⁾Center for Child and Community Health Research, Department of Pediatrics, Johns Hopkins School of Medicine, Baltimore, MD

⁽³⁾Baltimore City Health Department, Baltimore, MD

⁽⁴⁾Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

⁽⁵⁾Division of Adolescent and Young Adult Medicine, Department of Pediatrics, Johns Hopkins School of Medicine, Baltimore, MD

Abstract

Background: Ensuring patients receive appropriate (CDC-recommended) and prompt (≤ 14 days of specimen collection) treatment is critical to decrease gonorrhea and early syphilis (ES) incidence. The objectives were to: 1) quantify treatment performance among community healthcare practices (CHPs); 2) compare CHP treatment performance to local health department goals; and 3) describe variation in treatment performance by CHP characteristics in Baltimore City, Maryland.

Methods: Surveillance data for gonorrhea and ES diagnoses reported between January 2018 – December 2019 were used. Treatment performance measures were calculated for each CHP (gonorrhea: 171 CHPs; ES: 122 CHPs). Measures were: 1) percent treated among all diagnoses (goal: $\geq 90\%$); 2) percent appropriately-treated among diagnoses treated (goal: $\geq 90\%$ gonorrhea, $\geq 95\%$ ES); and 3) percent promptly-treated among diagnoses appropriately-treated (goal: $\geq 85\%$). Treatment performance measures and achievement of goals were compared across CHP characteristics.

Results: For gonorrhea, median percent treated, appropriately-treated, and promptly-treated was 71.4%, 95.0%, and 100.0%, respectively. 29.8% met treated goals. The majority achieved appropriately-treated (62.9%) and promptly-treated (76.8%) goals. CHPs reporting high (vs. low) volume of gonorrhea diagnoses less frequently achieved percent-treated goals (12.2% vs. 35.4%, $p = 0.008$). Median value for all ES treatment performance measures was 100.0%. Most achieved treated (90.2%) and appropriately-treated (95.9%) goals. 49.2% achieved the promptly-treated

goal. CHPs reporting high (vs. low) volumes of ES less frequently achieved promptly-treated goals (33.3% vs. 54.4%, $p=0.045$).

Conclusions—Substantial gaps in reporting gonorrhea treatment and prompt ES treatment were observed. Practice-level interventions to facilitate reporting gonorrhea treatment and provide prompt ES treatment are needed.

Summary:

Among community healthcare practices in Baltimore, Maryland, the majority provided patients with prompt, appropriate treatment for gonorrhea and early syphilis. Gaps in reported treatment and prompt treatment also were observed.

Keywords

gonorrhea; syphilis; treatment performance

Introduction

In the United States (U.S.), incidence of bacterial sexually transmitted infections (STIs) continue to increase. Between 2018-2022, reported gonorrhea diagnosis rates increased by 9% from 178.3 to 194.4 per 100,000. Diagnosis rates for primary & secondary syphilis, and early latent syphilis increased by 65% (from 10.7 to 17.7 per 100,000) and 45% (from 11.8 to 17.1 per 100,000), respectively. (1) Prompt treatment of bacterial STIs with U.S. Centers for Disease Control and Prevention (CDC) recommended regimens is critical to reduce ongoing STI transmission, HIV acquisition and transmission, development of severe sequelae, and emergence of antimicrobial resistance.(2–4) It is also a key strategy outlined in the STI National Strategic Plan for reducing gonorrhea and early syphilis (primary, secondary or early latent syphilis) incidence by 10% by 2030.(5)

Community healthcare providers (CHPs) report over three-quarters of STI diagnoses in the U.S.(1, 6) CHPs, which include private sector practices, federally qualified health centers (FQHCs), and acute care settings (e.g., emergency departments and urgent care facilities), are essential partners for STI treatment and prevention. However, limited existing data on gonorrhea and early syphilis (ES) treatment practices (i.e., time-to-treatment, treatment completion, etc.) among CHPs are mixed. One recent study using claims data from private healthcare settings showed that only 34.8% of patients had evidence of receiving CDC-recommended gonorrhea treatment.(7) In contrast, other studies from Denver, New York City, California, and Massachusetts reported that most (82 – 96%) patients received appropriate gonorrhea treatment.(8–11) Another study among 20 U.S. STD programs showed that a median of 63.0% of all reported gonorrhea diagnosis in 2014 were treated appropriately.(12) Data on treatment practices are more limited for ES. Recent studies, however, have shown that only about two-fifths of pregnant women in Arizona, Georgia, Michigan, New Jersey, New York State and Washington received adequate syphilis treatment,(13) and that a rapid screening process decreased time-to-treatment among sexual minority men (SMM).(14) Additional limitations of prior work include a focus on select populations (i.e., sexual health clinic patients, pregnant women, SMM)(13–15) rather than

all CHPs within a specified jurisdiction, and/or examined treatment provision at the patient-level(7–15) rather than at the provider- or practice-level. Data on variation in treatment practices by CHP characteristics (i.e., practice specialty, populations served, etc.) also are lacking. Examining treatment provision among all CHPs within a jurisdiction may identify practice-specific gaps to inform locally tailored, practice-level interventions to improve treatment completion, and, ultimately, reduce STI transmission at the community level.

Performance measures, such as percent treated and time-to-treatment have previously been used to quantify, compare, and evaluate STI prevention programs.(16) Benchmarks also have been employed to identify and monitor progress towards measurable and relevant performance improvement goals.(17, 18) However, as noted in the STI National Strategic Plan, data are needed to establish national performance improvement goals to monitor the percentage of patients with gonorrhea, and separately, syphilis who are treated with a CDC-recommended regimen.(5) The goal of this analysis was to generate baseline data to monitor and evaluate gonorrhea and syphilis treatment performance among CHPs in Baltimore City, Maryland, a mid-Atlantic city with persistent gonorrhea and syphilis epidemics. The objectives were to: 1) quantify treatment performance among CHPs; 2) compare CHP treatment performance to local health department treatment performance goals (i.e., achievement measures); and 3) identify practice-level characteristics associated with achievement of local treatment performance goals among CHPs reporting gonorrhea, and separately, ES diagnoses.

Materials and Methods

Setting

Baltimore City, Maryland, has some of the highest reported rates of gonorrhea and syphilis diagnoses in the U.S. In 2019, compared to national rates, reported diagnosis rates in Baltimore City were 3.6-times higher (670.8 vs.187.8 per 100,000) and 4.2-times higher than the national gonorrhea and ES (103.9 vs. 24.6 per 100,000) diagnosis rates, respectively.(1, 19)

Data Sources

Public health surveillance data, including treatment information on all gonorrhea and ES diagnoses reported to the Baltimore City Health Department (BCHD) between January 1, 2018 and December 31, 2019 were used. BCHD routinely performs treatment verification for all gonorrhea cases who are female, males with extragenital infection, and cases randomly selected (~20% of all reported cases) for enhanced surveillance activities for the STD Surveillance Network program (SSuN). Treatment information for other gonorrhea cases is obtained through morbidity forms that are faxed or mailed by the diagnosing provider to the BCHD. For all ES cases, BCHD routine performs treatment assurance, whereby disease intervention specialists will attempt to locate and bring these individuals to a provider for treatment when treatment cannot be confirmed with the diagnosing provider. All treatment information is entered into the electronic case management/disease registry system; however, documentation of “not” treated vs. “no information” is not systematically recorded.

Treatment information was aggregated by CHP location, which served as the unit of analysis. CHPs located within Baltimore City and reporting at least one gonorrhea diagnosis, and separately, at least one ES diagnosis over a two-year period (January 1, 2018, and December 31, 2019) were included in the analysis. Programs or practices that did not routinely provide treatment (i.e., mobile outreach programs, and some drug treatment centers, etc.) were excluded.

Measures

For each CHP, three treatment performance and three performance achievement measures were calculated separately for gonorrhea and ES diagnoses. The three treatment performance measures included the percent of reported diagnoses that were: 1) treated; 2) appropriately treated; and 3) promptly treated. Percent treated was calculated as the number of reported diagnoses for which the BCHD received any treatment documentation divided by the total number of diagnoses. We defined treated as those for whom BCHD had treatment documentation. Percent appropriately treated was calculated as the number of diagnoses with documentation of CDC-recommended treatment divided by the total number of diagnoses treated. Appropriate treatment was based on the 2015 CDC treatment guidelines, which was the recommended guidance during the observation period (gonorrhea: ceftriaxone 250mg or cefixime 400mg, plus either single-dose azithromycin 1g or 7-days of doxycycline 100mg twice daily; ES: single-dose benzathine penicillin 2.4 million units or 14-days of doxycycline 100mg twice daily). (20) Percent promptly treated was calculated as the number of reported diagnoses receiving appropriate treatment within 14 days of specimen collection divided by the total number of diagnoses appropriately treated. The 14-day timeframe was selected to align with CDC performance measures for Strengthening STD Prevention and Control for Health Department grant recipients.

Performance achievement measures were designed to operationalize treatment performance measures into dichotomous indicators of achievement of BCHD treatment performance goals (Yes/No). Goals were selected by BCHD leadership as benchmarks to ensure disease control in the context of increasing cases. Goals were defined as documentation of 1) any treatment for at least 90% of reported diagnoses; 2) appropriate treatment for at least 90% of treated diagnoses (at least 95% for ES); and 3) prompt treatment for at least 85% of diagnoses appropriately treated.

CHP Characteristics

CHP characteristics of interest included practice type, reported STI diagnosis volume, funding source, and populations served. Practice type was defined based on services provided or practice specialty and was categorized as: health department-managed sexual health clinics; FQHCs; private sector practices (outpatient clinics including, but not limited to, pediatric, adult primary care, family medicine, obstetrics and gynecology, and family planning clinics); acute care (emergency departments, urgent care, and retail pharmacy clinics); hospitals; HIV/Infectious Disease specialty clinics; corrections facilities, behavioral health clinics (clinics that provide inpatient or outpatient mental health and/or substance use treatment), and school-based/university clinics.

Reported STI diagnosis volume was defined based on the distribution of reported gonorrhea and, separately, ES diagnoses by CHP. Using the 75th percentile to delineate high vs. low STI diagnosis volume practices, high STI diagnosis volume reporters were CHPs that reported greater than 22 gonorrhea diagnoses or 5 ES diagnoses during the observation period.

Funding source was defined as receipt of Title X funding (Yes/No), which are granted to practices that provide patients below the federal poverty line with family planning, reproductive health, and preventive health services. Data from Office of Population Affairs' Title X Directory Archive(21) was used to identify CHPs that received Title X funding during the observation period.

A subset consisting of private sector practices, acute care, and FQHCs was used to examine treatment provision among CHPs serving children, adults, and patients assigned female at birth. We dichotomized this subset based on their provision of pediatric care, adult primary or acute care, or women's health services, defined as obstetrics/gynecology (OB-GYN) and/or family planning facilities.

Statistical Analyses

Summary statistics (median and interquartile range (IQR) for treatment performance measures; frequencies for performance achievement measures) were generated. Statistical testing was performed to assess differences in performance achievement across CHP characteristics using Pearson chi-squared tests or Fisher's exact tests, as appropriate. Statistical significance was defined using a *p*-value less than 0.05. Analyses were conducted using R Version 4.2.1 (R Foundation for Statistical Computing, Vienna, Austria).

Ethical Approval

This analysis used routinely collected public health surveillance data for the purposes of public health program evaluation and improvement, and in accordance with the Code of Federal Regulations, Title 45, is exempt from institutional review, and was approved by the BCHD.

Results

For gonorrhea, the analysis included information on 171 CHPs, which collectively reported 5,576 gonorrhea diagnoses between January 1, 2018, and December 31, 2019, and accounted for 72.9% of the 7,652 gonorrhea diagnoses reported to the BCHD during this period. The median gonorrhea diagnoses reported per CHP was 5 (IQR: 2-22). Half of CHPs (49.7%) were private practices. High volume clinics included both sexual health clinics, 76.9% (10/13) of hospitals, and 36.8% (7/19) of FQHCs, and 33.3% (8/24) of acute care clinics. Among the 128 CHPs that were private, acute care, and FQHC practices, 44.5% (57/128) served pediatric populations, 54.7% (70/122) served as adult populations, and 40.6% (52/128) provided women's health services.

For ES, the analysis included information on 120 CHPs, which reported 1,114 ES diagnoses between January 1, 2018 and December 31, 2019, and represented 89.2% of all reported

ES diagnoses (1,249) during the two-year period. The median diagnoses reported per CHP was 3 (IQR: 1-5). One-third (34.4%) were private practices. High volume clinics included both STI clinics, and 44.4% (8/18) of hospitals, 42.7% (3/7) of HIV/ID specialty clinics, 40.0% (2/5) of corrections facilities and 25.0% (4/16) of FQHCs and (4/16) acute care clinics. Among the 74 private, acute care and FQHC CHPs, 48.7% (36/74) served pediatric populations, 74.3% (55/74) served as adult populations, and 48.6% (36/74) provided women's health services.

Gonorrhea Treatment Performance

Overall, the median (IQR) percent treated by CHP was 71.4% (50.0 – 97.9%), 95.0% (81.3%-100.0%) for percent appropriately treated, and 100.0% (86.0%-100.0%) for percent promptly treated (Table 1). For performance achievement measures, approximately thirty percent (29.8%, 51/171) reported any treatment for at least 90% of diagnoses; 62.9% (95/151 CHPs reporting any treatment) reported appropriately treating at least 90% of those treated; and 76.8% (109/142 CHPs reporting appropriate treatment) reported treating at least 85% of those appropriately treated within 14 days of specimen collection.

Some differences in gonorrhea treatment performance measures by CHP characteristics were observed (Table 2). The median percentage of diagnoses treated and median percentage appropriately treated varied considerably by provider type, while the median percentage of diagnoses promptly treated were similar across practice types. All three treatment performance measures were similar among reported STI diagnosis volumes, and CHPs serving pediatric (vs. non-pediatric) and adult (vs. non-adult) populations. Compared to CHPs not receiving Title X funding, we observed higher median percent treated but lower median percent promptly treated. Similarly, the median percent treated was higher, but the median percent promptly treated was lower among CHPs that provide women's health services compared to those that did not.

There were differences in performance achievement measures by CHP characteristic. All three performance achievement goals differed significantly by practice type. Except for sexual health clinics (100.0%) and school-based/university clinics (58.3%), fewer than half of all other provider types met BCHD's goal for reported treatment. Across all practice types, more clinics achieved BCHD's goals for both appropriate (range: 52.6% - 100.0%) and prompt treatment (range: 50.0% - 100.0%) than reported treatment. FQHCs consistently had the lowest proportion of clinics meeting BCHD's goals. High-volume (vs. low-volume) reporters less frequently achieved goals for reporting treatment (12.2% vs. 35.4%, $p = 0.008$). Fewer CHPs providing women's health services (vs. those that do not) achieved BCHD's prompt treatment goal (56.3% vs. 87.1%, $p < 0.001$). CHPs receiving Title X-funding were less frequently achieved BCHD's prompt treatment goal in comparison to non-recipients (53.3% vs. 79.5%, $p = 0.051$), though this difference was not statistically significant.

Early Syphilis

The median percentage for overall ES diagnoses treated by CHP was 100% (100 – 100%), 100% (100 – 100%) for diagnoses appropriately treated, and 100.0% (60.0 – 100%) for

diagnoses promptly treated (Table 3). Most CHPs (90.2%, 110/122) reported any treatment for at least 90% of reported diagnoses, and nearly all (95.9%, 116/121) provided appropriate treatment to at least 95% of diagnoses treated. About half (49.2%; 59/120) met BCHD's goal of appropriately treating at least 85% of diagnoses within 14 days of specimen collection.

Treatment performance and performance achievement measures were mostly similar across CHP characteristics (Table 4). Some differences in achieving promptly treated goals were observed by practice type, populations served, and funding source; however, these differences were not statistically significant. Neither sexual health clinic met BCHD's promptly treated goal compared to between 43.8%-100.0% of all other practice types. CHPs reporting high (vs. low) STI volume diagnoses less frequently achieved BCHD's goal for diagnoses promptly treated (33.3% vs. 54.4%, $p = 0.045$).

Discussion

We examined STI treatment practices among community health providers which collectively reported 72.9% of gonorrhea and 89.2% of ES diagnoses in Baltimore City, Maryland. More than half of CHPs reported treatment for the majority of gonorrhea (median percent treated: 71.4%) and all ES (median percent treated: 100.0%) diagnoses reported during the observation period. Substantial gaps were observed in CHP-level treatment practices for gonorrhea and ES. Fewer than one-third of CHPs achieved BCHD's goal for reporting gonorrhea treatment for at least 90% of their reported diagnoses. However, when treatment was reported, the majority achieved appropriately treated and promptly treated goals. In contrast, nearly all CHPs that diagnosed ES achieved treated and appropriately treated goals, but only two-fifths achieved the promptly treated goal. Differences in achievement measures by CHP characteristic also were observed. For gonorrhea, all three performance achievement measures differed significantly by practice type. Additionally, CHPs reporting low (vs. high) STI diagnosis volumes more frequently (35.4% vs. 12.2%) reported any treatment for at least 90% of diagnoses, and achievement of BCHD's goal for promptly treated differed significantly by provision (vs. no provision) of women's health services (56.3% vs. 87.1%). For ES, prompt treatment differed significantly by reporting volume, with low (vs. high) volume CHPs more frequently treating at least 85% of syphilis diagnoses (54.4% vs. 33.3%) within 14-days of specimen collection.

The most substantial gap was report of any gonorrhea treatment information to the BCHD. This may reflect a combination of suboptimal provider reporting of gonorrhea treatment information – despite legal mandates – and patient inability or unwillingness to return for treatment. Indeed, one program found that, among 251 gonorrhea cases with missing treatment documentation, 86% had been treated appropriately.⁽¹²⁾ This underscores the need for strategies to facilitate provider-initiated treatment reporting, which could include promulgating reporting requirements to CHPs through health commissioner letters or public health detailing campaigns, CHP staff on legal reporting requirements or implementing automated methods to transmit treatment information from electronic health record systems into STI surveillance registries.

Patients with symptomatic gonorrhea infection may be more likely to receive same-day treatment.(22) We were unable to quantify the proportion of symptomatic patients diagnosed by each CHP; however, all hospitals, acute care and sexual health clinics achieved gonorrhea prompt treatment goals, which may be explained by high proportion of patients presenting with symptoms or recent sexual exposure in these settings (vs. other settings such as primary care). Similarly, clinicians in CHPs that provide women's health services and/or were Title X recipients (which is focused on reproductive health services) may be less likely to provide presumptive or same-day treatment than clinicians in other settings.(23) Patients assigned female (vs. male) at birth present less frequently with symptoms, and symptoms consistent with gonorrhea infection (i.e., vaginal discharge) could be due to other pathogens.(2, 22, 24) Time-to-treatment for asymptomatic patients or patients with no known exposure is dependent on laboratory processing time, time to receive notification of results, and time for the patient to return to clinic for a ceftriaxone injection by a qualified provider. Further delays may occur if patients need to obtain ceftriaxone at a pharmacy before returning to clinic for treatment. Potential solutions to decrease time from diagnosis to treatment include increased access to highly sensitive and specific point-of-care (POC) tests, incentivizing CHPs to stock ceftriaxone on-site, or allowing pharmacies to administer injectable antimicrobials when dispensing to patients.(25)

Nearly all CHPs that diagnosed ES during the observation period achieved goals for diagnoses treated and appropriately treated. This, in part, reflects differences in BCHD's treatment verification and assurance practices for syphilis compared to gonorrhea. It is possible that providers are more familiar with CDC-recommended treatment for syphilis, which has remained unchanged for years, while gonorrhea treatment guidelines have been frequently updated.(26, 27) The observed lower frequency of prompt treatment for ES compared to gonorrhea, could be explained partially by differences in symptom presentation and same-day treatment practices. Indeed, 90.1% of gonorrhea cases compared to 77.2% of ES cases were treated within 14-days of specimen collection (data not shown). Given syphilis is often asymptomatic and diagnosis is dependent on serology,(27) treatment, therefore, depends on the patient returning to a CHP upon notification of positive results. This underscores the need for better syphilis diagnostics, and specifically, implementation of POC tests to decrease time from diagnosis to treatment.(14)

Our observation that more than half of CHPs reported any treatment for a majority of their reported diagnoses is consistent with previous studies on gonorrhea treatment provision among 20 STD programs throughout the U.S.,(12) family planning and infectious disease specialty clinics in New York City(9), and throughout California,(10) but was higher than the proportion reported by Tao et al. for patients diagnosed in private healthcare settings.(7) The Tao et al., study was conducted from 2016-2018, and it is possible that our results reflect increasing provider awareness of treatment guidelines over time. Additionally, our observation that CHPs specializing in women's health less frequently achieved BCHD's prompt treatment goal is consistent with previous findings. OB/GYNs had been found to have lower rates of knowledge about CDC-recommended treatment for uncomplicated gonorrhea (when compared to a random sample that also included pediatricians, internists, and family medicine physicians) and had lower likelihoods of treating patients with CDC-recommended regimens.(28)

In contrast with prior work,(29) we found that that high STI diagnosis volume reporters were less frequently reported any gonorrhea treatment. We hypothesize this may be due to barriers to provider-initiated treatment reporting by high-volume CHPs, which, in Baltimore City, mostly consist of large practices or affiliates of larger provider group networks, and automated reporting systems to submit morbidity forms may improve treatment reporting. Based on previous findings for chlamydia,(30) we expected Title X-funded practices to have higher estimates across all measures compared to non-recipients. Although most Title X-funded CHPs achieved the BCHD's goal for prompt ES treatment, most Title X-funded CHPs that reported diagnoses of gonorrhea during the observation period did not. This could represent differences in populations served by Title X-funded clinics, or given that many Title X-funded clinics also provide obstetric care, findings could reflect an increased focus on maternal syphilis (vs. gonorrhea) screening and treatment.

Some additional limitations should be considered when interpreting these results. We were limited in the practice-level characteristics we could evaluate from public health surveillance data. There may be other unmeasured factors—for example, staff turnover—that may influence treatment performance. The sexual health clinics are managed by the BCHD, and treatment information is readily available;. differences in observed estimates among sexual health clinics (compared to other settings) may reflect differences in the ascertainment of treatment information rather than true differences in treatment provision. Gonorrhea treatment only was verified with the diagnosing provider; patients treated by another facility may have been misclassified as not treated. Though most patients with treatment documentation were appropriately treated, CHPs prescribing CDC-recommended treatments may be more likely to report treatment, introducing information bias. Lastly, data were collected prior to the COVID-19 pandemic and the 2021 updated STD Treatment Guidelines and, therefore, may not be generalizable to current treatment practices in this or other settings.

This analysis provides a model for using surveillance data to identify jurisdiction-wide gaps in STI treatment practices. To improve treatment performance metrics, data generated as part of this analysis were used to generate individualized treatment performance dashboards that were disseminated to each CHP along with information on updated CDC treatment guidelines. Identification of CHP characteristics associated with lower treatment performance can inform practice-level interventions, such as tailored public health detailing campaigns to narrow observed gaps. Similar analyses could inform the establishment of baseline estimates and incremental performance goals for assessing progress towards achieving overall STI treatment outcomes, and ultimately, reduce gonorrhea and ES incidence.

Conflicts of Interest and Sources of Support:

All the authors contributed to the study design, data collection and analysis, and have reviewed and approved the final manuscript. This work was supported by the U.S. Centers for Disease Control and Prevention STD Surveillance Network (SSuN, NH25PS004259), the U.S. Centers for Disease Control and Prevention Sexually Transmitted Disease Prevention and Control for Health Departments (STD-PCHD, NU25PS005126) and the U.S. Centers for Disease Control and Prevention Ferguson RISE Fellowship Program. The authors report no conflicts of interest.

References

1. Centers for Disease Control and Prevention. Sexually Transmitted Disease Surveillance 2020. Atlanta; 2022.
2. Tuddenham S, Hamill MM, Ghanem KG. Diagnosis and Treatment of Sexually Transmitted Infections: A Review. *JAMA*. 2022;327(2):161–72. [PubMed: 35015033] .
3. Workowski KA, Berman SM, Douglas JM Jr. Emerging antimicrobial resistance in *Neisseria gonorrhoeae*: urgent need to strengthen prevention strategies. *Ann Intern Med*. 2008;148(8):606–13. [PubMed: 18413622]
4. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sexually transmitted infections*. 1999;75(1):3–17. [PubMed: 10448335] .
5. US Department of Health and Human Services. Sexually Transmitted Infections National Strategic Plan for the United States: 2021–2025. Washington, DC; 2020..
6. Cramer R, Leichter JS, Gift TL. Are safety net sexually transmitted disease clinical and preventive services still needed in a changing health care system? *Sex Transm Dis*. 2014;41(10):628–30..
7. Tao G, Workowski K, Bowden KE, et al. Estimating Recommended Gonorrhea and Chlamydia Treatment Rate Using Linked Medical Claims, Prescription, and Laboratory Data in US Private Settings. *Sex Transm Dis*. 2021;48(3):167–73. [PubMed: 33003184]
8. McWhirter L, Lou Y, Reingold S, et al. Rates of Appropriate Treatment and Follow-Up Testing After a Gonorrhea and/or Chlamydia Infection in an Urban Network of Federally Qualified Health Center Systems. *Sex Transm Dis*. 2022;49(5):319–24. [PubMed: 35001017]
9. Boyajian AJ, Murray M, Tucker M, et al. Identifying variations in adherence to the CDC sexually transmitted disease treatment guidelines of *Neisseria gonorrhoeae*. *Public Health*. 2016;136:161–5. [PubMed: 27179879]
10. Lechtenberg RJ, Samuel MC, Bernstein KT, et al. Variation in adherence to the treatment guidelines for *Neisseria gonorrhoeae* by clinical practice setting, California, 2009 to 2011. *Sex Transm Dis*. 2014;41(5):338–44. [PubMed: 24722391]
11. Swails J, Smock L, Hsu K. Provider characteristics associated with guideline-nonadherent gonorrhea treatment, Massachusetts, 2010. *Sex Transm Dis*. 2014;41(2):133–6. [PubMed: 24413495] .
12. Bowen VB, Torrone EA, Peterman TA. Verifying Treatment of Reported Cases of Gonorrhea. *Sex Transm Dis*. 2016;43(2):130–3. [PubMed: 26760184] .
13. Tannis A, Miele K, Carlson JM, et al. Syphilis Treatment Among People Who Are Pregnant in Six U.S. States, 2018–2021. *Obstet Gynecol*. 2024;143(6):718–29. [PubMed: 38626449]
14. Obafemi OA, Wendel KA, Anderson TS, et al. Rapid Syphilis Testing for Men Who Have Sex With Men in Outreach Settings: Evaluation of Test Performance and Impact on Time to Treatment. *Sex Transm Dis*. 2019;46(3):191–5. [PubMed: 30363029]
15. Stracker N, Williford SL, Gilliams E, et al. Factors Associated With Chlamydia and Gonorrhea Treatment Completion Among Sexual Health Clinic Patients, Baltimore City, Maryland; 2018 to 2019. *Sex Transm Dis*. 2023;50(5):265–73. [PubMed: 36728272]
16. Peterman TA, Newman DR, Collins DE, et al. Sexually transmitted diseases program performance measures: how are they performing? *Sex Transm Dis*. 2011;38(7):610–6. [PubMed: 21278623]
17. Sequeira S, Morgan JR, Fagan M, et al. Evaluating Quality of Care for Sexually Transmitted Infections in Different Clinical Settings. *Sex Transm Dis*. 2015;42(12):717–24. [PubMed: 26562703]
18. Institute of Medicine (US) Committee on a Comprehensive Review of the HHS Office of Family Planning Title X Programs. Appendix K, Measurement of Quality in the Title X Family Planning Program. In: Stith Butler A, Wright Clayton E, ed. *A Review of the HHS Family Planning Program: Mission, Management, and Measurement of Results*. Washington (DC): National Academies Press (US); 2009.
19. Sexually Transmitted Infections, 2019 Annual Report. Baltimore, MD; 2020.
20. Workowski KA, Bolan GA, Centers for Disease C, et al. Sexually transmitted diseases treatment guidelines, 2015. *MMWR Recomm Rep*. 2015;64(RR-03):1–137.

21. Office of Population Affairs. Title X Program Archive of Funding History by Fiscal Year. available at: <https://opa.hhs.gov/grant-programs.archive/title-x-program-archive/title-x-program-funding-history>.
22. Hilbert SM, Reno HEL. Management of Patients with Sexually Transmitted Infections in the Emergency Department. *Emerg Med Clin North Am*. 2018;36(4):767–76. [PubMed: 30297003]
23. Elder H, Platt L, Leach D, et al. Factors Associated With Delays in Presentation and Treatment of Gonorrhea, Massachusetts 2015–2019. *Sex Transm Dis*. 2024;51(3):146–55. [PubMed: 38133572]
24. Kane BG, Guillaume AWD, Evans EM, et al. Gender Differences in CDC Guideline Compliance for STIs in Emergency Departments. *West J Emerg Med*. 2017;18(3):390–7. [PubMed: 28435489]
25. Barrow RY, Ahmed F, Bolan GA, et al. Recommendations for Providing Quality Sexually Transmitted Diseases Clinical Services, 2020. *MMWR Recomm Rep*. 2020;68(5):1–20. [PubMed: 31899459]
26. Workowski KA. Centers for Disease Control and Prevention Sexually Transmitted Diseases Treatment Guidelines. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. 2015;61 Suppl 8:759..
27. Workowski KA, Bachmann LH, Chan PA, et al. Sexually Transmitted Infections Treatment Guidelines, 2021. *MMWR Recomm Rep*. 2021;70(4):1–187.
28. Bornstein M, Ahmed F, Barrow R, et al. Factors Associated With Primary Care Physician Knowledge of the Recommended Regimen for Treating Gonorrhea. *Sex Transm Dis*. 2017;44(1):13–6. [PubMed: 27898574]
29. Weston EJ, Workowski K, Torrone E, et al. Adherence to CDC Recommendations for the Treatment of Uncomplicated Gonorrhea - STD Surveillance Network, United States, 2016. *MMWR Morb Mortal Wkly Rep*. 2018;67(16):473–6. [PubMed: 29698384]
30. Chow JM, de Bocanegra HT, Hulett D, et al. Comparison of adherence to chlamydia screening guidelines among Title X providers and non-Title X providers in the California Family Planning, Access, Care, and Treatment Program. *J Womens Health (Larchmt)*. 2012;21(8):837–42. [PubMed: 22694761]

Table 1.

Treatment performance and performance achievement for gonorrhea diagnoses among community healthcare providers, Baltimore City, Maryland, January 2018 – December 2019.

	Percent of diagnoses treated (n = 171) ¹	Percent of diagnoses treated appropriately (n = 151) ²	Percent of diagnoses treated promptly (n = 142) ³
Treatment Performance	<i>median (IQR)</i>	<i>median (IQR)</i>	<i>median (IQR)</i>
	71.4 (50.0 – 97.9)	95.0 (81.3 – 100.0)	100.0 (86.0 – 100.0)
Health Department Goal	≥ 90	≥ 90	≥ 85
Performance Achievement	% (n)	% (n)	% (n)
	29.8 (51/171)	62.9 (95/151)	76.8 (109/142)

¹ Among 171 community healthcare practices that reported at least one gonorrhea diagnosis. Treated was defined as health department documentation of any gonorrhea treatment.

² Among 151 community healthcare practices with treatment documented for at least one reported gonorrhea diagnosis. Appropriate treatment was defined as documentation with a CDC-recommended treatment as per the 2015 CDC Treatment Guidelines, the guidance in place during the observation period.

³ Among 142 community healthcare practices with appropriate treatment documented for at least one reported gonorrhea diagnosis. Prompt treatment was defined as appropriate treatment prescribed within 14 days of specimen collection.

Gonorrhea treatment performance and performance achievement among community practices by practice characteristics, Baltimore City, Maryland, January 2018 – December 2019 (n = 171 providers)

Practice Characteristics	Treated ¹ [Health Department Goal: ≥ 90%]			Appropriately Treated ² [Health Department Goal: ≥ 90%]			Promptly Treated ³ [Health Department Goal: ≥ 85%]		
	N	Median % Diagnoses Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Appropriately Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Promptly Treated per Practice (IQR)	% Practices achieving goal (n)
Practice Type (n = 171)									
Sexual Health Clinics	2	90.9 (90.6 – 91.2)	100.0 (2)	2	96.7 (96.2 – 97.2)	100.0 (2)	2	87.6 (86.7 – 88.4)	100.0 (2)
FQHC	19	69.1 (57.1 – 76.2)	5.3 (1)	19	94.4 (81.3 – 100.0)	52.6 (10)	18	86.1 (69.2 – 92.2)	50.0 (9)
Private Sector	88	72.9 (50.0 – 100.0)	31.8 (28)	73	100.0 (80.0 – 100.0)	65.8 (48)	68	100.0 (81.3 – 100.0)	70.6 (48)
Hospital	13	71.0 (61.1 – 88.9)	23.1 (3)	12	91.1 (84.0 – 93.1)	58.3 (7)	12	96.2 (93.9 – 99.5)	100.0 (12)
Acute Care	24	71.8 (66.4 – 90.6)	25.0 (6)	24	84.7 (84.6 – 100.0)	58.3 (14)	24	100.0 (100.0 – 100.0)	100.0 (24)
HIV Specialty or Infectious Disease	6	79.5 (57.1 – 100.0)	33.3 (2)	5	94.7 (92.5 – 100.0)	80.0 (4)	4	94.6 (82.1 – 100.0)	75.0 (3)
Behavioral Health Clinics ⁴	7	50.0 (0.0 – 100.0)	28.6 (2)	5	50.0 (0.0 – 66.7)	0.0 (0.0)	3	(100.0 – 100.0)	100.0 (3)
School-Based/University Clinics	12	95.0 (72.2 – 100.0)	58.3 (7)	11	100.0 (100.0 – 100.0)	90.9 (10)	11	100.0 (75.0 – 100.0)	72.7 (8)
Reporting STI Volume Diagnoses (n = 171)									
Low (≤ 22 cases)	130	71.4 (50.0 – 100)	35.4 (46)	110	100.0 (75.0 – 100.0)	65.5 (72)	101	100.0 (83.3 – 100.0)	73.3 (74)
High (> 22 cases)	41	72.2 (69.2 – 81.3)	12.2 (5)	41	90.9 (86.2 – 94.6)	56.1 (23)	41	92.5 (88.0 – 96.4)	85.4 (35)
Funding Source (n = 171)									
Title X Funded	15	86.2 (74.7 – 100)	40.0 (6)	15	100.0 (87.7 – 100.0)	73.3 (11)	15	88.9 (73.5 – 100.0)	53.3 (8)
Not Title X Funded	156	70.9 (50.0 – 92.3)	28.9 (45)	136	94.8 (80.0 – 100.0)	61.8 (84)	127	100.0 (88.7 – 100.0)	79.5 (101)
Population Served (n=128)									
Pediatric	57	70.0 (50.0 – 86.2)	24.6 (14)	52	97.9 (81.5 – 100.0)	63.5 (33)	51	95.2 (75.0 – 100.0)	66.7 (34)
Non-Pediatric	71	72.2 (50.0 – 100.0)	29.6 (21)	64	96.2 (80.6 – 100.0)	60.9 (39)	59	100.0 (89.5 – 95.2)	79.7 (47)
Adult	70	70.2 (50.0 – 85.7)	21.4 (15)	60	95.4 (82.6 – 95.4)	63.3 (38)	58	100.0 (85.7 – 100.0)	77.6 (45)
Non-Adult	57	73.6 (54.2 – 100.0)	34.5 (20)	56	98.7 (75.0 – 100.0)	60.7 (56)	52	100.0 (81.3 – 100.0)	69.2 (36)

Practice Characteristics	Treated ¹ [Health Department Goal: ≥ 90%]			Appropriately Treated ² [Health Department Goal: ≥ 90%]			Promptly Treated ³ [Health Department Goal: ≥ 85%]		
	N	Median % Diagnoses Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Appropriately Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Promptly Treated per Practice (IQR)	% Practices achieving goal (n)
Women's Health	52	75.6 (66.0 – 100.0)	26.9 (14)	51	92.9 (80.8 – 100.0)	56.9 (29)	48	89.9 (69.6 – 100.0)	56.3 (27)
Non-Women's Health	76	66.7 (50.0 – 94.1)	27.6 (21)	65	100.0 (84.6 – 100.0)	66.2 (43)	62	100.0 (96.4 – 100.0)	87.1 (54)

¹ Among 171 community healthcare practices that reported at least one gonorrhea diagnosis were included (Subset for population served included 128 practices). Treated was defined as health department documentation of any gonorrhea treatment.

² Among 151 community healthcare practices with treatment documented for at least one reported gonorrhea diagnosis. (Subset for population served included 116 practices). Appropriate treatment was defined as documentation with a CDC-recommended treatment as per the 2015 CDC Treatment Guidelines, the guidance in place during the observation period.

³ Among 142 community healthcare practices with appropriate treatment documented for at least one reported gonorrhea diagnosis. (Subset for Population served included 110 practices). ³ Prompt treatment was defined as appropriate treatment prescribed within 14 days of specimen collection.

⁴ Behavioral Health Clinics include clinics that provide mental health treatment, substance use treatment, or both.

Bolded numbers indicate a *p*-value < 0.05

Table 3.

Treatment performance and performance achievement for early syphilis diagnoses among community healthcare providers, Baltimore City, Maryland, January 2018 – December 2019.

	Percent of diagnoses treated (n = 122) ¹	Percent diagnoses treated appropriately (n = 121) ²	Percent of diagnoses treated promptly (n = 120) ³
Treatment Performance	<i>median (IQR)</i>	<i>median (IQR)</i>	<i>median (IQR)</i>
	100.0 (100.0 – 100.0)	100 (100.0 – 100.0)	83.6 (60.0 – 100.0)
Health Department Goal	≥ 90	≥ 95	≥ 85
Performance Achievement	% (n)	% (n)	% (n)
	90.2 (110)	95.9 (116)	49.2 (59)

¹ Among 122 practices community healthcare practices that reported at least one early syphilis diagnosis. Treated was defined as health department documentation of any early syphilis treatment.

² Among 121 community healthcare practices with treatment documented for at least one early syphilis diagnosis. Appropriate treatment was defined as documentation with a CDC-recommended treatment as per the 2015 CDC Treatment Guidelines, the guidance in place during the observation period.

³ Among 120 community healthcare practices with appropriate treatment documented for at least one reported early syphilis diagnosis. Prompt treatment was defined as appropriate treatment prescribed within 14 days of specimen collection.

Table 4.

Early syphilis treatment performance and performance achievement among community practices by practice characteristics, Baltimore City, Maryland 2018-2019 (n = 122 providers)

Practice Characteristics	Treated ¹ [Health Department Goal: ≥ 90%]			Appropriately Treated ² [Health Department Goal: ≥ 90%]			Promptly Treated ³ [Health Department Goal: ≥ 85%]		
	N	Median % Diagnoses Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Appropriately Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Promptly Treated per Practice (IQR)	% Practices achieving goal (n)
Practice Type (n = 122)									
Sexual Health Clinics	2	94.7 (94.4 – 95.0)	100.0 (2)	2	100.0 (100.0 – 100.0)	100.0 (2)	2	72.3 (70.1 – 74.6)	0.00 (0)
FQHC	16	100.0 (98.7 – 100.0)	93.8 (15)	16	100.0 (100.0 – 100.0)	100.0 (16)	16	82.8 (50.0 – 100.0)	43.8 (4)
Private Sector	42	100.0 (100.0 – 100.0)	88.1 (37)	41	100.0 (100.0 – 100.0)	97.6 (40)	40	84.3 (51.7 – 100.0)	50.0 (20)
Hospital	18	100.0 (100.0 – 100.0)	100.0 (18)	18	100.0 (100.0 – 100.0)	88.9 (16)	18	81.9 (76.2 – 100.0)	44.4 (8)
Acute Care	16	100.0 (100.0 – 100.0)	87.5 (14)	16	100.0 (100.0 – 100.0)	87.5 (14)	16	91.7 (78.9 – 100.0)	50.0 (8)
HIV Specialty or Infectious Disease	7	100.0 (98.0 – 100.0)	85.7 (6)	7	100.0 (100.0 – 100.0)	100.0 (7)	7	100.0 (50.0 – 100.0)	57.1 (4)
Corrections Facilities	5	100.0 (93.3 – 100.0)	80.0 (4)	5	100.0 (100.0 – 100.0)	100.0 (5)	5	85.7 (60.0 – 96.7)	60.0 (3)
Behavioral Health Clinics ⁴	11	100.0 (100.0 – 100.0)	81.8 (9)	11	100.0 (100.0 – 100.0)	100.0 (11)	11	33.3 (0.0 – 100.0)	36.4 (4)
School-Based/University Clinics	5	100.0 (100.0 – 100.0)	100.0 (5)	5	100.0 (100.0 – 100.0)	100.0 (5)	5	100.0 (100.0 – 100.0)	100.0 (5)
Reporting STI Volume Diagnoses (n = 122)									
Low (≤ 5 cases)	92	100.0 (100.0 – 100.0)	92.4 (85)	91	100.0 (100.0 – 100.0)	96.7 (88)	90	100.0 (50.0 – 100.0)	54.4 (49)
High (> 5 cases)	30	98.3 (92.3 – 100.0)	83.3 (25)	30	100.0 (100.0 – 100.0)	93.3 (28)	30	82.1 (76.2 – 87.5)	33.3 (10)
Funding Source (n = 122)									
Title X Funded	13	100.0 (100.0 – 100.0)	100.0 (13)	13	100.0 (100.0 – 100.0)	100.0 (13)	13	91.7 (81.8 – 100.0)	61.5 (8)
Not Title X Funded	109	100.0 (100.0 – 100.0)	89.0 (97)	108	100.0 (100.0 – 100.0)	95.4 (103)	107	83.3 (60.0 – 100.0)	47.7 (51)
Population Served (n=74)									
Pediatric	36	100.0 (100.0 – 100.0)	91.7 (33)	36	100.0 (100.0 – 100.0)	100.0 (36)	36	82.4 (50.0 – 100.0)	44.4 (16)
Non-Pediatric	38	100.0 (100.0 – 100.0)	86.8 (33)	37	100.0 (100.0 – 100.0)	91.9 (34)	36	100.0 (63.3 – 100.0)	52.8 (19)
Adult Primary/acute Care	55	100.0 (100.0 – 100.0)	85.4 (47)	54	100.0 (100.0 – 100.0)	96.3 (52)	54	81.2 (50.0 – 100.0)	42.6 (23)

Practice Characteristics	Treated ¹ [Health Department Goal: ≥ 90%]			Appropriately Treated ² [Health Department Goal: ≥ 90%]			Promptly Treated ³ [Health Department Goal: ≥ 85%]		
	N	Median % Diagnoses Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Appropriately Treated per Practice (IQR)	% Practices achieving goal (n)	N	Median % Diagnoses Promptly Treated per Practice (IQR)	% Practices achieving goal (n)
Non-Adult	19	100.0 (100.0 – 100.0)	100.0 (19)	19	100.0 (100.0 – 100.0)	94.7 (18)	18	100.0 (66.7 – 100.0)	66.7 (12)
Women's Health	36	100.0 (100.0 – 100.0)	94.4 (34)	36	100.0 (100.0 – 100.0)	100.0 (36)	36	84.5 (66.7 – 84.5)	50.0 (18)
Non-Women's Health	38	100.0 (100.0 – 100.0)	84.2 (32)	37	100.0 (100.0 – 100.0)	91.9 (34)	36	81.7 (51.7 – 100.0)	47.2 (17)

¹ Among 122 community healthcare practices that reported at least one early syphilis diagnosis. (Subset for population served included 74 practices). Treated was defined as health department documentation of any early syphilis treatment.

² Among 121 practices community healthcare practices with treatment documented for at least one reported early syphilis diagnosis (Subset for population served included 73 practices). Appropriate treatment was defined as documentation with a CDC-recommended treatment as per the 2015 CDC Treatment Guidelines, the guidance in place during the observation period.

³ Among 120 community healthcare practices with appropriate treatment documented for at least one reported early syphilis diagnosis. (Subset for population served included 72 practices). Prompt treatment was defined as appropriate treatment prescribed within 14 days of specimen collection.

⁴ Behavioral Health Clinics include clinics that provide mental health treatment, substance use treatment, or both.