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Evaluation of the electronic health record as a tool for maternal and congenital syphilis surveillance

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Abstract

Background. Early entry into prenatal care and timely syphilis diagnosis and treatment of pregnant women can prevent congenital syphilis (CS). We assessed syphilis testing and treatment for pregnant women and their infants using electronic health records (EHRs).

Methods. We extracted syphilis testing results from pregnancy episodes documented in EHRs for women seeking care at the Medical University of South Carolina health system during 2021–2022. Chart reviews confirmed syphilis diagnosis, stage, and treatment. We calculated percentages of pregnant women who were 1) screened for syphilis, 2) received abnormal (i.e. reactive) test results, 3) newly diagnosed with syphilis, and 4) adequately treated for syphilis before delivery. We assessed testing and treatment outcomes of infants exposed to maternal syphilis.

Results. Among 12,959 pregnant women, 75% (n= 9,708) had ≥ 1 syphilis test during pregnancy; 106 (1.1%) had ≥ 1 abnormal test. From chart reviews, 54 women (51%) with abnormal tests were newly diagnosed with syphilis. The remaining abnormal tests were false positives (n=15) or previous diagnoses (n=37). Forty-four (81%) new diagnoses were treated during pregnancy; 30 (56%) were treated >30 days before delivery. Fifty-six infants born to women with an abnormal syphilis test were evaluated for CS of whom 24 (43%) had abnormal test results and 18 (75%) were treated for CS.

Conclusions. Although EHRs could reliably assess syphilis testing during pregnancy, chart review and consultation with public health authorities were necessary to confirm adequate treatment and CS follow-up. Triangulating EHRs with other data sources could enhance understanding of syphilis during pregnancy and inform CS prevention efforts.

Short summary

Electronic health records (EHRs) from a statewide health system indicated 75% of pregnant women were screened for syphilis. EHRs could not identify new diagnoses or treatment in mothers and infants.

Keywords

syphilis; congenital syphilis; surveillance; pregnancy

Introduction

The number of reported syphilitic infections increased nearly 500% among reproductive age women in the U.S. between 2014 and 2023.(1) Early syphilitic infections, especially within 2 years of conception, significantly increase the risk of congenital syphilis (CS) and can ultimately lead to miscarriage, stillbirth, or neonatal death.(2) As a result of increasing cases of maternal syphilis, CS infections also continue to rise.(3)

The Centers for Disease Control and Prevention (CDC) and U.S. Preventative Services Task Force (USPSTF) recommend that all pregnant women be screened for syphilis during the first prenatal care visit to identify infection early enough to treat and prevent CS.(4, 5) CDC also recommends screening for syphilis at 28 weeks gestation and at delivery for women who live in areas with high rates of syphilis (defined as 4.6 per 100,000), are at high risk of syphilis themselves, or were not previously tested for syphilis during pregnancy.(4) In April 2024, the American College of Obstetricians and Gynecologists released a practice advisory recommending universal screening for syphilis at the first prenatal visit, in the third trimester, and on admission for labor.(6) Due to increasing cases of CS, some jurisdictions have mandatory third trimester and/or delivery syphilis screening.(7) If syphilis is diagnosed and either treated late in pregnancy or goes untreated, it can be transmitted to the infant and result in severe health outcomes, including death.(8) Missed CS prevention opportunities identified among U.S. pregnancies include lack of prenatal care, no syphilis testing and treatment during pregnancy, and late prenatal care resulting in syphilis testing late in pregnancy and inadequate treatment (e.g., treatment provided less than 30 days before delivery).(9)

Electronic health records (EHRs) have previously been used to successfully monitor chlamydia and gonorrhea testing and infections during pregnancy,(10) and could be a potential resource for understanding syphilis testing, diagnosis, and treatment patterns during pregnancy. Some EHRs allow for the linkage of maternal and neonatal records to assess outcomes in mothers and their infants. EHRs also could be a useful tool to supplement information about CS reported in the National Notifiable Diseases Surveillance System where maternal and infant records cannot be linked. Improved surveillance through data captured in EHRs may also contribute to the understanding of screening practices in pregnant women diagnosed with syphilis who do not deliver an infant with CS.(11)

The primary objective of this analysis was to use data extracted from an EHR about a cohort of pregnant women receiving care at a large statewide hospital system to describe syphilis testing, diagnosis, and treatment patterns during pregnancy. Our secondary objective was

to explore the utility of EHRs to identify and verify receipt of appropriate treatment for infants with CS. The knowledge learned from this evaluation could inform the understanding of missed opportunities for CS prevention by considering screening practices for women who do not deliver an infant with CS and expand the potential uses of EHR for syphilis surveillance and prevention.

Methods

This study was approved by the Medical University of South Carolina (MUSC) Institutional Review Board (Pro00106414) and is part of an ongoing longitudinal study of the feasibility of STI surveillance in pregnant women seeking prenatal care within an urban, academic medical center and affiliated regional health network hospitals (RHNs) located in rural and underserved communities. We have previously described details about the methodology we used to extract EHR data to monitor STI positivity during pregnancy.(10) Briefly, we used the EPIC© (Verona, WI) Clarity application within the EHR to identify women with a pregnancy episode seeking any prenatal care between January 1, 2021, and December 31, 2022. Pregnancy episodes bundle all pregnancy-related care visit documentation (outpatient and inpatient), laboratory tests, and imaging within the EHR. We extracted the following fields from the EHR: hospital where care was received, date of last menstrual period, age, primary insurer, self-reported ethnicity and race, estimated date of delivery (EDD), zip code, county, home address, and date of delivery (when applicable). We assigned each patient a score based on the social vulnerability index (SVI) assigned to the census tract of their geocoded home address (range 0–1). (12, 13) We then categorized each patient as living in an area with a high (>0.75), medium-high (>0.5 – 0.75), medium-low (>0.25 – 0.5), or low ($\leq$ 0.25) SVI. In the event women received care for more than one pregnancy during the study period, we considered outcomes from only the first unique pregnancy in this study. The EPIC Clarity language variables for this analysis are in Appendix 1.

We assessed syphilis screening during pregnancy by calculating the percentage of women with at least one documented syphilis test. We used Chi-Square tests to compare the proportion of women screened for syphilis by year (2021 or 2022), hospital location (university vs RHNs), self-reported race (Black, White, other), ethnicity (Latina or non-Latina), insurer (private, public, or uninsured), SVI (high, medium-high, medium-low, or low), and trimester during which syphilis testing first occurred (first, second, third, or at delivery).

Syphilis testing algorithms varied by hospital within the MUSC health system. The reverse syphilis screening algorithm is exclusively used to test for syphilis in pregnant women by the university hospital and some (but not all) of the RHNs.(14) In the reverse algorithm, treponemal specific antibodies, syphilis IgM/IgG, are the initial test. When the first test is reactive, a second treponemal specific test, TPPA, is performed. A non-treponemal test, rapid plasma reagins (RPR), is performed for reactive treponemal antibodies. Non-treponemal tests, specifically RPR, are typically used when testing newborns for syphilis before hospital discharge after delivery. When available, we collected results from non-treponemal tests (quantitative titer and qualitative results) and treponemal tests for syphilis tests in pregnant women and newborns. Test results were considered abnormal if the

quantitative non-treponemal titer was $\geq 1:1$, the qualitative non-treponemal syphilis test result was “reactive,” or the treponemal test (e.g. syphilis IgM/IgG) result was > 8.0 . In the reverse algorithm, a false positive test was defined as a initial treponemal antibody test that was reactive, but the confirmatory treponemal specific test was non-reactive and the RPR was non-reactive. In the traditional algorithm, the initial RPR test is reactive but the confirmatory treponemal specific tests are non-reactive.

We extracted all syphilis test results (both treponemal and non-treponemal) performed during a pregnancy episode. We calculated the number of days between the syphilis test collection date and the date of delivery, when available, or the EDD. We used these dates to classify the timing of first syphilis test during pregnancy into first trimester (≥ 181 days before delivery), second trimester (90–180 days before delivery), third trimester (7–89 days before delivery), or at delivery (≤ 7 days from date of delivery). Using the EHR medication administration record, we extracted the medication name, dose, date of administration, and number of treatments received during pregnancy. We used this information to calculate the number of days from the date of abnormal syphilis test to treatment initiation. Syphilis stage was not available in our dataset. We performed chart reviews for all pregnancy episodes with an abnormal syphilis test to obtain stage of disease (primary, secondary, early latent, or late latent/unknown duration) and to determine if treatment received was in accordance with current CDC STI treatment guidelines.⁽⁴⁾ Syphilis treatment received outside the MUSC health system, (e.g., public health department) was not captured in a structured field in the EHR. We classified patients as historical cases when the chart review found documentation of a syphilis diagnosis and adequate treatment before pregnancy and no indication of re-infection. We classified cases where syphilis stage or treatment history could not be determined from chart review as unknown stage.

Not all women who received pregnancy care delivered an infant in the MUSC health system. We identified the infants born in the health system through linkage to the maternal pregnancy episode. Infant syphilis test results and treatment information were extracted from the EHR. We calculated the proportion of infants with syphilis testing among the total number of infants delivered to determine the percentage of infants evaluated for CS. Among infants with abnormal infant syphilis tests, we consulted a disease intervention specialist at the South Carolina Department of Public Health (SCDPH) to verify if the infant met the case definition for CS (15) and if they received and completed appropriate treatment. All analyses were conducted using SAS Enterprise version 8.3 (SAS Institute, Cary, North Carolina).

Results

Over the two-year study period, 13,516 pregnancy episodes were extracted from the EHR from 12,959 unique women. For this analysis, we included the first pregnancy episode for each woman, of which 6,406 (49%) occurred in 2021 and 6,553 (51%) occurred in 2022. Most women received care from the university hospital ($n=9,036$; 70%) located in an urban academic medical center. The remaining women sought care from three RHNs ($n=3,923$, 30%). Seventy-five percent ($n=9,708$) of included pregnant women had a syphilis test. A higher percentage of pregnant women during 2021 had at least one syphilis test [$n=4,911$ (77%)] compared to 2022 [$n=4,797$ (73%)]. Syphilis testing during pregnancy

was more frequent at the university hospital compared to the RHNs [n=6,823 (76%) and n=2,775 (72%), respectively]. A higher proportion of pregnant women with private and public insurance had syphilis testing [n=6,397 (76%) and n=3,120 (75%), respectively] compared to those with no insurance [n=191 (44%)]. Higher proportions of pregnant women living in areas classified as high or low SVI were screened for syphilis [n=2,854; 76% and n=2,017; 78%, respectively] compared to pregnant women living in areas with a medium-high (n=2,560; 72%) or medium-low (n=2,277; 74%) SVI. The percentage of women with a syphilis test during pregnancy care did not meaningfully differ by age, race, or ethnicity. Overall, 47% of women delivered an infant within the MUSC health system (n= 6,034). A higher proportion of women who delivered an infant within the MUSC health system were tested during pregnancy compared to those who did not deliver within the MUSC health system [n=4,986 (83%) and n=4,722 (68%)] (Table 1).

Among the 9,708 women tested for syphilis, 59% (n=5,758) had more than one syphilis test during pregnancy, with 292 (3%) having 4 or more tests. The majority of women had their first documented syphilis test during the first trimester of pregnancy (66%; n=6,373). The first documented syphilis test occurred during the second and third trimester for 13% (n=1,233) and 12% (n=1,206), respectively; 9% (n=850) had their first syphilis test at delivery. Overall, 106 (1.1%) screened women had at least one abnormal result; 54 were first identified in the first trimester (52%), 20 in the second trimester (19%), 16 in the third trimester (15%), and 14 at delivery (13%). The trimester was unknown for 2 abnormal tests (Table 2). The number of abnormal syphilis tests was similar between study years [2021, n= 55 (1.1%) and 2022, n= 51 (1.1%)].

Among the 106 women with at least 1 abnormal syphilis test, 80 (75%) abnormal tests were first collected when initiating prenatal care. The remaining 26 (25%) abnormal results were first identified in subsequent pregnancy care visits. Using chart review, we determined that 15 (14%) of these abnormal test results were false positives, 37 (35%) were historical or previously treated infections, 44 (42%) were new diagnoses of untreated active syphilis, and 10 (9%) did not have adequate documentation to determine stage or treatment status from either the EHR extract or chart review. Among the 44 women classified as having untreated active syphilis, approximately half were ≥ 26 years (n=22), publicly insured (n=21; 48%), and lived in areas that were not classified as having a high SVI (n=23; 52%). Approximately three-quarters of women classified as having untreated active syphilis described themselves as Black (n=32; 73%) or received care at the main university hospital (n=35; 80%). Untreated active syphilis was diagnosed at the first prenatal care visit within the MUSC health system for 39 of 44 women (89%); the remaining 5 women were diagnosed with untreated active syphilis at a subsequent visit after having a normal syphilis test result. Untreated active syphilis was most frequently diagnosed during the first trimester (n=19 [43%]; second trimester n=8 [18%]; third trimester n=8 [18%]; delivery n=8 [18%]; unknown timepoint n=1 [2%]). Treatment for syphilis was administered to 46 (43%) women with at least 1 abnormal syphilis test. All 44 (100%) women with untreated active syphilis received treatment during pregnancy, one woman with previously treated syphilis was treated again during pregnancy, and one woman with undetermined syphilis stage and treatment history was treated during pregnancy (Figure 1). A complete treatment history was available for 40 of the 44 women with untreated active syphilis, of whom 32 (80%) were

treated according to CDC STI treatment guidelines for their stage of syphilis. The median time from the first abnormal test date to initiating treatment was 13 days (IQR 5–37). Delivery dates were documented for 39 women with both untreated active syphilis and a complete treatment history, of whom, 8 (21%) received treatment less than 30 days before delivery and were considered inadequately treated to prevent CS. Of these, three women were diagnosed in the first trimester, two in the second trimester, one in the third trimester, and two at delivery (Table 2).

Overall, 9,343 delivered infants were associated with 12,959 pregnancy episodes in the EHR: 4,619 (49%) in 2021 and 4,724 (51%) in 2022. Less than 1 percent of infants were tested for syphilis regardless of whether they delivered in the health system [50/6031 (0.83%)] or elsewhere [20/3312 (0.60%)]. Among the 106 women with an abnormal syphilis test, 55 (52%) delivered an infant who was tested for syphilis within the MUSC health system (one woman delivered twins for a total of 56 infants). Thirty-two (57%) of the 56 infants tested for syphilis had a negative RPR: 17 (32%) had mothers with active untreated syphilitic infections, 12 (38%) had mothers with previously treated syphilis, 2 (6%) had mothers with a false positive test result, and 1 (3%) had a mother with an unknown maternal syphilis stage and treatment status. Twenty-four infants, including the set of twins, had abnormal RPR results; 17 (71%) had mothers with active untreated syphilis, and 7 (29%) had mothers with previously treated syphilis. A total of 27 infants had treatment for syphilis documented in their EHR. Eighteen of 24 (75%) infants with a reactive RPR received treatment for syphilis and an additional nine infants with a non-reactive RPR received treatment for presumed CS: 7 (78%) immediately after delivery and 2 (22%) during outpatient follow up. One of these infants had skin changes consistent with CS. SCDPH confirmed that all 27 infants who received any treatment as documented in the health system EHR were considered a case of CS and were appropriately treated.

Discussion

Per CDC guidelines, three quarters of pregnant women seeking prenatal care in the MUSC health system were screened for syphilitic infection at least once. The first syphilis test occurred during the first trimester for approximately two-thirds of pregnant women screened. The EHR proved to be a useful tool to access and analyze the number and timing of syphilis tests during pregnancy. Of women screened for syphilis during pregnancy, 1.1% had a reactive test. However, we were not able to determine whether an abnormal syphilis test result represented untreated or historic syphilis, the stage of syphilis, and whether women were treated according to CDC guidelines in the EHR dataset extracted for this analysis. A chart review was necessary to differentiate between historic syphilitic infection (EHR documentation of previously treated syphilis) and untreated syphilitic infections. As such, specimen collection dates and test results captured in EHRs might be best suited to monitor adherence to syphilis screening recommendations during pregnancy, including repeat screening in the third trimester and at delivery. EHR may also have utility for identifying gaps in syphilis screening for pregnant women by demographic characteristics, geography, and other factors of interest to inform prevention activities and education initiatives for clinicians related to CS.

Although structured fields extracted from an EHR could be used to identify abnormal syphilis tests in both pregnant women and infants, these data do not distinguish between historic and untreated syphilitic infection. The proportion of women who have an abnormal syphilis test more than 12 months after adequate treatment (e.g. serofast) is estimated to be 10% (IQR 4.8%–19.1%).⁽¹⁶⁾ As a result, we could not solely rely on syphilis test results alone to identify a new diagnosis of syphilis. From chart reviews, only 42% of women with an abnormal syphilis test in our analysis were confirmed to have untreated infection. Without review of clinical documentation in individual medical records, we could not accurately identify new diagnoses of syphilis, assign a stage to the syphilitic infection, or determine the appropriateness of treatments received according to stage. Structured EHR fields were able to identify that 18 (75%) infants with an abnormal syphilis test and 9 (28%) infants with a normal syphilis test were treated for syphilis. However, collaboration with the public health department was necessary to definitively classify the infant as a CS case and assure the infant completed treatment. The necessity of our collaboration to close the loop on congenital syphilis cases emphasizes the importance of the public health department infrastructure for eliminating late congenital syphilis, which can have devastating consequences for children.

Our analysis of EHR data identified missed opportunities for maternal testing and treatment. Absence of or late syphilis testing during pregnancy accounts for 30–40% of national CS cases.⁽⁹⁾ Due to ongoing increases in annual syphilitic infections both nationwide and in South Carolina, clinicians should consider collecting a syphilis test when evaluating women for pregnancy-related concerns in the absence of prenatal testing. Among pregnant women tested for syphilis, 20% had their first test in the third trimester. Late diagnosis of syphilis in pregnancy is associated with a higher likelihood of inadequate or no treatment and accounts for 42% of CS cases in the United States.⁽⁹⁾ Of the 44 confirmed cases of untreated active syphilis in pregnancy, we identified eight women (18%) who did not receive adequate treatment before delivery. Among those women who were treated, the median time from a positive test to initiating treatment was approximately two weeks. Syphilis test results collected within our health system are available within 48 hours. The additional time to treatment may be explained by the need for women to return in person for penicillin injections. Our observations in a statewide health system echo previously described “missed opportunities” for the prevention of CS. National and local efforts are needed to increase earlier and adequate pregnancy care, universal syphilis testing, and adequate treatment to prevent CS.

Our analysis of EHR data only considered care received within a single health system. Syphilis testing and treatment that occurred during pregnancy outside of the MUSC health system were missing from this analysis. We identified that women who did not deliver an infant within our health care system were less likely to have syphilis screening. Potential reasons why women receiving prenatal care did not deliver an infant within our healthcare system may include: their pregnancy was not completed during study period, they may have moved their prenatal care to another health care system, or they may have relocated out of state or out of network. Therefore, we cannot address syphilis testing that may have occurred later in pregnancy in this subgroup of our cohort. Additionally, we observed that pregnant women who did not have health insurance were less likely to have a syphilis test in the

EHR. Uninsured women may receive prenatal care, including prenatal laboratory evaluation, at federally qualified health centers or free clinics within their communities. Records from these facilities are not captured within the EHR. It is possible that some women receiving prenatal care within the health system were tested and treated for syphilis in other locations, including the health department. In communities where women are frequently referred to the health department for syphilis treatment, additional data sources are needed to supplement treatment information extracted from the EHR. It is also possible that women may be diagnosed with and assigned a stage of syphilis in another location but receive treatment within the MUSC health system and have no documentation of an abnormal syphilis test result in the EHR. Without complete documentation of both the syphilis stage and treatment from providers outside the MUSC health system, clinicians may elect to treat pregnant woman with abnormal test results due to concerns for untreated maternal syphilis resulting in CS. As a result, it is challenging to know which abnormal syphilis tests truly represent untreated maternal infection.

Due to the complexity of diagnosing syphilis, particularly during pregnancy, the information collected and extracted from the MUSC health system's EHR had limited ability to assess abnormal syphilis test results without additional chart review. We supplemented EHR extraction of syphilis test results with chart reviews and consultation with the health department to obtain an accurate picture of syphilitic infection among pregnant women and their infants. Despite limitations, EHR data were useful to understand syphilis screening patterns among women receiving prenatal care from one health system. The methods used in this analysis could be applied to EHRs from other health systems, particularly among health systems using EPIC, the most commonly used EHR in the US. (17) Specific gaps identified in screening from such analyses can inform educational approaches to improve clinicians' knowledge and practice. Improving processes to link syphilis screening and treatment information extracted from the EHR with other data sources, including public health surveillance, could enhance the overall understanding of syphilitic infection before and during pregnancy and help with the development of innovative prevention strategies for CS in the US.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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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.

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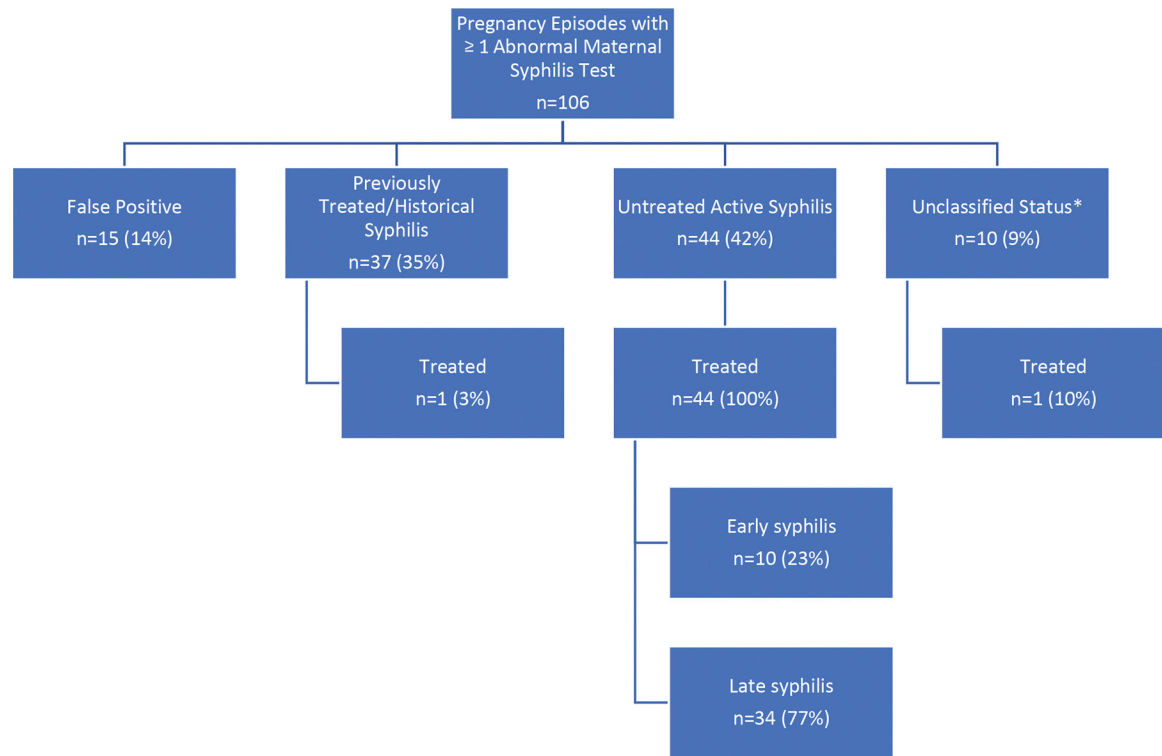


Figure 1.
Pregnant women with at least 1 abnormal syphilis test in the Medical University of South Carolina Health System, 2021–2022

*Unclear documentation of maternal syphilis diagnosis, stage, and/or treatment.

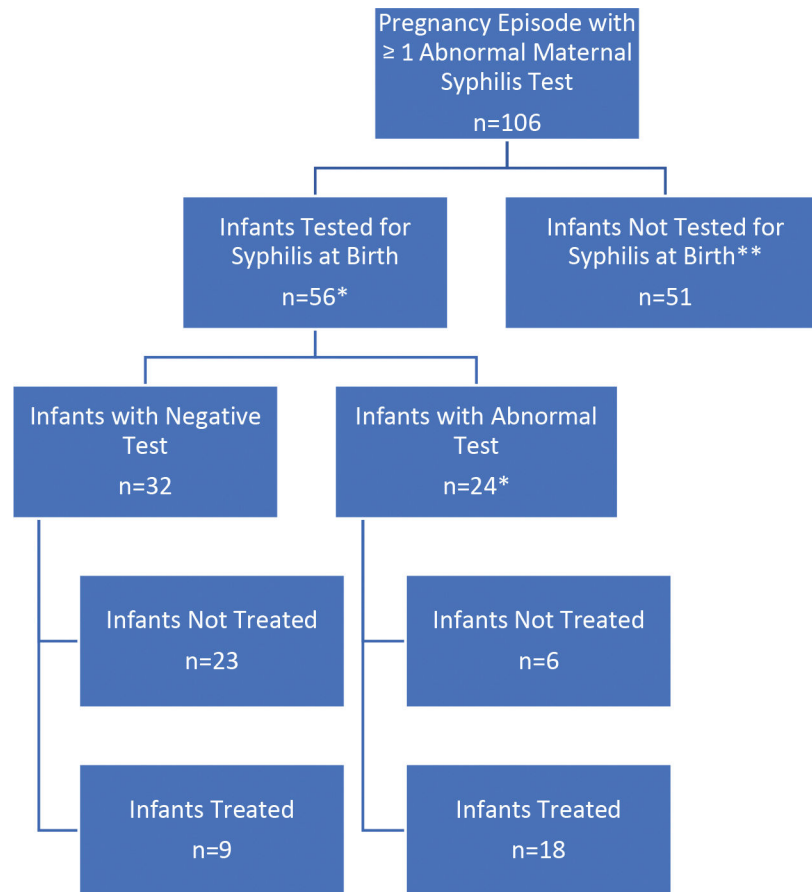


Figure 2.

Evaluation of infants in the case of abnormal maternal syphilis test.

*One mother with an abnormal syphilis test delivered a set of twins. Both twins were tested after delivery and had abnormal syphilis tests. Their mother was adequately treated for syphilis prior to delivery and these infants were not treated.

** Syphilis tests were not collected for n=51 infants. Of these, 16 had no additional maternal information in the EHR and 35 had no infant delivery information. Three of these 35 were noted to be non-viable pregnancies (1 molar pregnancy, 1 fetal death, and 1 neonatal death day of life 2).

Table 1.

Characteristics of pregnant women seeking care at the Medical University of South Carolina (MUSC) Health System by syphilis screening status, 2021–2022

	Screened for syphilis N (%) [*]	Not screened N (%) [*]
Total	9708 (75%)	3251 (25%)
Hospital ^{**}		
University Hospital	6853 (76%)	2183 (24%)
Regional Hospital Network	2855 (73%)	1068 (27%)
Age		
≤ 25 years	3298 (76%)	1049 (24%)
≥ 26 years	6410 (74%)	2202 (26%)
Race		
Black	3591 (76%)	1120 (24%)
White	4884 (75%)	1654 (25%)
Other [^]	1160 (76%)	374 (24%)
Ethnicity		
Latina	903 (75%)	309 (25%)
Non-Latina	8623 (76%)	2774 (24%)
Insurer ^{***}		
Public	3120 (75%)	1032 (25%)
Private/Military	6397 (76%)	1973 (24%)
None	191 (44%)	246 (56%)
Social vulnerability index ^{****}		
High (> 0.75)	2854 (76%)	893 (24%)
Medium-High (>0.5 – 0.75)	2560 (72%)	992 (28%)
Medium-Low (>0.25 – 0.50)	2277 (74%)	811 (26%)
Low (≤0.25)	2017 (78%)	555 (22%)
Delivered within hospital system ^{***}		
Yes	4986 (83%)	1048 (17%)
No	4722 (68%)	2203 (32%)

Number of missing observations for the following variables: race (n, 176) and ethnicity (n, 350).

[^] Other race includes Asian, American Indian/Alaska Native, and Native Hawaiian/Pacific Islander

^{*} Row percentages

^{**} Chi-Square Test p = 0.002

^{****} Chi-Square Test p < 0.0001

Unless otherwise noted, Chi-Square Test p-value > 0.05

Table 2.

Syphilis screening results and treatment outcomes among pregnant women screened for syphilis and documented in the electronic health records at the Medical University of South Carolina Health System, 2021–2022

	N	%
Total Screened	9708	
Trimester of First Test		
First	6373	66%
Second	1233	13%
Third	1206	12%
Delivery	850	9%
Missing	46	
Number of Tests during Pregnancy		
1 test	3950	41%
>1 test	5758	59%
Abnormal Test Results	106	
Timing of Abnormal Result		
Identified during first test	80	75%
Identified at subsequent test after first normal test	26	25%
Trimester Abnormal Result Identified		
First	54	5%
Second	20	19%
Third	16	15%
Delivery	14	13%
Missing	2	
Case status of Abnormal Results		
Untreated Active Syphilis	44	42%
Undetermined Status	10	9%
False Positive	15	14%
Previously Treated Infection	37	35%
Trimester of Abnormal Syphilis Tests *		
First	24	45%
Second	11	21%
Third	9	17%
Delivery	9	17%
Missing	1	
Syphilis Stage for Abnormal Syphilis Tests *		
Early	10	19%
Late	34	63%

	N	%
Indeterminate	10	19%
Syphilis Treatment Documented	44	
Timing of Treatment		
>30 days before delivery	30	79%
≤ 30 days before delivery	8	21%
Missing treatment dates	5	
Missing delivery date	1	
Number of Days from Abnormal Test to Treatment		
Median (IQR ^{**})	13	(5–37)

* False positive and previously treated syphilitic infections excluded

** IQR, interquartile range