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Exploring an epidemic: maternal and congenital syphilis in New Mexico

Abstract

Objectives: Syphilis is a sexually transmitted infection that, when left untreated in pregnancy, can lead to severe consequences for the neonate, including congenital syphilis and death. This study aims to characterize the populations within New Mexico (NM) most impacted by syphilis during pregnancy with the aim of enabling future interventions to decrease maternal and congenital syphilis rates.

Methods: A retrospective chart review was completed by reviewing electronic medical records of pregnant individuals who delivered at University of New Mexico Hospital (UNMH) between January 1, 2023 and June 30, 2024. Inclusion criteria for maternal and infant data included a confirmed positive maternal Treponema pallidum antibody test (TPAB) during pregnancy or during the birth hospitalization. Information collected included maternal and infant demographics, substance use, number of prenatal visits, timing of syphilis testing and treatment, and extent of congenital syphilis workup of the infant.

Results: A total of 224 charts from pregnant individuals were reviewed, with 78 having confirmed maternal syphilis infection. Results indicated a lack of adequate prenatal care was associated with delayed syphilis testing, resulting in missed opportunities for maternal treatment. Additionally, a significantly lower birth weight was seen in infants born to individuals with a positive syphilis test less than 30 days before delivery, as compared to infants born to individuals with a positive test greater than 30 days from birth (2.61 ± 0.12 kg vs 3.03 ± 0.10 kg, $p<0.01$).

Conclusions: Despite state-wide efforts to improve syphilis screening during pregnancy in NM, many individuals continue to undergo their first syphilis testing past the period when they could complete adequate treatment prior to delivery. Improving accessibility of testing and education on syphilis are crucial steps to reducing the disease burden and improving maternal and infant outcomes in NM.

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Introduction

Congenital syphilis is caused by the spirochete bacteria *Treponema pallidum*, with transmission potentially occurring during pregnancy or at the time of delivery.[1] While acquired syphilis infection has three stages, transplacental transmission with fetal infection can occur during any stage.[1] Infants with congenital syphilis may be asymptomatic at birth, though some will present with preterm birth, hydrops, or demise.[2] Although there was a reported overall decrease in sexually transmitted infections by the Centers for Disease Control and Prevention (CDC), congenital syphilis cases continued to increase in 2024 for the 12th consecutive year.[3]

Despite the American College of Obstetricians & Gynecologists (ACOG) recommending syphilis screening during pregnancy at the first prenatal visit, during the third trimester, and at birth,[4] many states follow their specific legal recommendations.[5] This is often only one screening test at the first prenatal visit. As syphilis may be asymptomatic in the pregnant individual while causing numerous infant complications, it is critical to properly identify and treat pregnant individuals with syphilis to avoid congenital transmission. Common childhood complications include deafness, keratitis, abnormal bone development, intellectual impairment, or death.[6]

The current law in New Mexico (NM) is one-time screening during pregnancy.[5] In 2022, NM ranked first in the United States for the number of congenital syphilis cases. This prompted the NM Department of Health (NMDOH) to release a public health order to follow ACOG recommendations of three tests during pregnancy.[7] We aimed to investigate a subset of the NM population impacted by syphilis infection during pregnancy. Through better understanding of this population, ideal areas for intervention can be targeted.

Methods

This single-site, retrospective chart review was completed following Institutional Review Board approval at the University of New Mexico Health Sciences Center (UNM HSC IRB #24-353). The UNM HSC Clinical and Translational Science Center Data Warehouse served as honest broker to provide electronic medical records (EMRs) of pregnant individuals who delivered at UNM hospital (UNMH) between January 1, 2023 and June 30, 2024.

Pregnant individuals were included if they had a positive *Treponema pallidum* antibody (TPAB) test during the pregnancy or at the time of the birth hospitalization. All infants born to included pregnant individuals were included unless they were wards of the state. Exclusion criteria included pregnant individuals who were treated for syphilis prior to becoming pregnant, those with low-positive titers determined to reflect a previously treated infection with low suspicion for re-infection, and individuals with documented HIV infection in the EMR.

Basic demographic data collected included the pregnant person's race, ethnicity, insurance coverage, and housing status. Additional information included the number of prenatal visits within the UNMH system, diagnoses of concomitant sexually transmitted infections (STI), and substance use during pregnancy (including tobacco, alcohol, cannabis, opioids, and methamphetamines). The timing of

syphilis testing in relation to delivery, titer testing timing and results, and treatment information was collected.

Infant information included sex, birth weight, syphilis testing (TPAB with reflex Rapid Plasma Reagin (RPR) test), and components of any congenital syphilis workup completed including treatment.

The data was summarized descriptively; Chi-Square or Fisher's Exact tests were used to compare more than two groups of categorical data, while student's t-test or one-way Analysis of Variance (ANOVA) were used to compare continuous variables. A p-value of ≤0.05 was considered statistically significant.

Results

A total of 224 charts were reviewed; of those, 146 individuals had non-reactive syphilis antibody testing. The remaining 78 individuals had positive antibody testing, with reflex RPR obtained. The remaining results are from the 78 individuals with the positive antibody testing. Of the 78 individuals with the positive antibody testing, 9 had a non-reactive RPR, with the remaining having measurable titers.

Most individuals were white/Anglo (n=47, 60%) and had Medicaid insurance (n=64, 82%, Table 1). Fifteen individuals reported unstable housing during pregnancy or in the three months prior to pregnancy (Table 1). More individuals had another known STI when the RPR was reactive, with no individuals having another known STI in the nonreactive RPR group (p<0.01, Table 1). Use of non-prescribed substances was similar across all groups (p=0.23, Table 1).

Table 1 Results

Days from positive screen to infant birth	**≤30 days n=35 n (%)**	**31-90 days n=13 n (%)**	**>90 days n=21 n (%)**	**RPR nonreactive n=9 n (%)**	***p*-value**
Ethnicity					0.73
Not Hispanic/ Latina	16 (45.7)	5 (38.5)	12 (57.1)	4 (44.4)	
Hispanic/ Latina	19 (54.3)	8 (61.5)	9 (42.9)	5 (55.6)	
Race					
White/ Anglo	24 (68.6)	8 (61.5)	9 (42.9)	6 (66.7)	
American Indian/ Alaska Native	11 (31.4)	4 (30.8)	9 (42.9)	1 (11.1)	
Black/ African American	0 (0)	1 (7.7)	3 (14.2)	1 (11.1)	0.07
Hawaiian Native or Pacific Islander	0 (0)	0 (0)	0 (0)	1 (11.1)	
Asian	0 (0)	0 (0)	0 (0)	0 (0)	
Decline to answer	0 (0)	0 (0)	0 (0)	0 (0)	
Unavailable	0 (0)	0 (0)	0 (0)	0 (0)	
Medical insurance type					
NM Medicaid	30 (85.7)	10 (76.9)	17 (81.0)	7 (77.8)	
HMO/PPO	0 (0)	0 (0)	1 (4.8)	0 (0)	0.1
Self-pay without payment plan	3 (8.6)	2 (15.4)	0 (0)	0 (0)	
Other government	2 (5.7)	1 (7.7)	3 (14.2)	0 (0)	
Pending medicaid	0 (0)	0 (0)	0 (0)	2 (22.2)	
Individual unhoused during pregnancy or 3 months prior					
Yes	9 (25.7)	3 (23.1)	2 (9.5)	1 (11.1)	0.57
No	18 (51.4)	8 (61.5)	12 (57.1)	4 (44.4)	
Unknown	8 (22.9)	2 (15.4)	7 (33.3)	4 (44.4)	
Individual with diagnosis of other sexually transmitted infections*					
Yes	9 (25.7)	10 (76.9)	19 (90.5)	0 (0)	<0.01
No	24 (68.6)	5 (38.5)	11 (52.4)	7 (77.8)	
Unknown	2 (5.7)	0 (0)	1 (4.8)	2 (22.2)	
Substance use during pregnancy*					
Tobacco	6 (17.0)	1 (7.7)	2 (9.5)	3 (33.3)	
Alcohol	3 (8.6)	0 (0)	3 (14.2)	1 (11.1)	0.23
Cannabis	8 (22.9)	4 (30.8)	1 (4.8)	2 (22.2)	
Opioids	14 (40.0)	5 (38.5)	11 (52.4)	0 (0)	
Methamphetamine	16 (45.7)	6 (46.2)	12 (57.1)	2 (22.2)	
Number of prenatal visits					
0	7 (20.0)	1 (7.7)	1 (4.8)	1 (11.1)	
1	10 (28.6)	0 (0)	1 (4.8)	0 (0)	0.005
2	3 (8.6)	2 (15.4)	0 (0)	0 (0)	
3+	10 (28.6)	9 (69.2)	18 (85.6)	7 (77.8)	
Unknown	5 (14.2)	1 (7.7)	1 (4.8)	1 (11.1)	

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Table 1 continued...

Number of previous syphilis diagnosis					
0	10 (28.6)	2 (15.4)	3 (14.2)	3 (33.3)	
1	13 (37.1)	3 (23.1)	8 (38.1)	5 (55.6)	0.47
2+	1 (2.9)	0 (0)	1 (4.8)	0 (0)	
Unknown	11 (31.4)	8 (61.5)	9 (42.9)	1 (11.1)	
Prior episode(s) treated					
Yes	9 (37.5)	3 (60.0)	8 (66.7)	5 (62.5)	0.84
No	4 (16.7)	0 (0)	1 (8.3)	0 (0)	
Unknown	11 (45.8)	2 (40.0)	3 (25.0)	3 (37.5)	
Infant sex					
Male	19 (54.2)	8 (61.5)	14 (66.7)	1 (11.1)	0.69
Female	16 (45.8)	4 (30.8)	7 (33.3)	6 (66.7)	
Unknown	0 (0)	1 (7.7)	0 (0)	2 (22.2)	
Delivery					
Vaginal	24 (68.5)	10 (76.9)	13 (61.9)	6 (66.7)	0.15
C-section	11 (31.4)	2 (15.4)	8 (38.1)	1 (11.1)	
Unknown	0 (0)	1 (7.7)	0 (0)	2 (22.2)	
Infant birth weights (kg)	2.61±0.12	3.14 ± 0.15	2.96±0.15	3.06±0.24	0.05
Adequate maternal treatment					
Yes	4 (11.4)	8 (61.5)	16 (76.2)	0 (0)	<0.001
No	17 (48.6)	2 (15.4)	0 (0.0)	2 (22.2)	
Unknown	14 (40.0)	3 (23.1)	5 (23.8)	7 (77.8)	
Infant RPR testing reactive					
Yes	16 (45.7)	6 (46.1)	11 (52.4)	0 (0)	0.12
No	18 (51.4)	5 (38.5)	9 (42.8)	6 (66.7)	
Unknown	1 (2.9)	2 (15.4)	1 (4.8)	3 (33.3)	
Infant received treatment (Reactive RPR)					
Yes	14 (87.5)	6 (100.0)	11 (100.0)	0 (0)	0.32
No	2 (12.5)	0 (0)	0 (0)	0 (0)	
Unknown	0 (0)	0 (0)	0 (0)	0 (0)	

*Individuals counted per report, so may be included for more than one infection or substance. Percent is based off the number of individuals in that group.

Nearly one-third of the individuals with a positive antibody testing during pregnancy did not have adequate prenatal care. There were significantly more individuals with inadequate prenatal care for those with testing close to the delivery date compared to the other groups (p=0.005, Table 1). Only 2 individuals had symptoms of the syphilis infection, highlighting the critical importance of prenatal care and appropriate screening.

When assessing if an infant needs evaluation and treatment, the timing of maternal treatment is critically important. Thus, the data was further analyzed into those with initial testing ≤30 days from the infant's birth, which would result in maternal treatment being inadequate. Thirty-five individuals (45%) had positive syphilis testing ≤30 days prior to delivery, with only 27% of individuals having positive syphilis testing >90 days prior to delivery (n=21). There was no difference in the groups for the number of prior syphilis diagnoses and for those with prior treatment (p=0.47 and p=0.84, respectively).

No differences were observed between the ethnicity, race, or type of medical insurance for individuals that had positive syphilis testing less than 30 days from the infant birth, between 31-90 days from the infant birth, more than 90 days from the infant birth, or had a non-reactive RPR test. Most pregnant individuals (58%) had test results that occurred >24 hours after the laboratory sample was obtained. Of the individuals with results within 24 hours of testing (n=26), only 31% received treatment the same day (n=8). A notable delay in the timing of results and the timing of treatment was observed.

The mode of delivery (p=0.15) and infant sex (p=0.69) did not differ between groups. The average birth weight of infants born to individuals with a reactive syphilis antibody test ≤30 days from delivery was significantly lower than individuals with a reactive syphilis antibody test >30 days from delivery or those that were negative (2.61 ± 0.12 kg vs 3.03 ± 0.10 kg, p<0.01). Significance was also observed when comparing the birth weights for infants born to individuals with a reactive RPR ≤30 days from birth, those with a reactive RPR 31-90 days from birth, those infants born to individuals with a reactive RPR >90 days from birth, and those infants born to individuals with a nonreactive RPR (F (3, 71)=2.72, p=0.05, Table 1).

Significantly more infants born to individuals with testing closer to delivery were noted to have inadequate maternal treatment (p<0.001), thus resulting in further evaluation and treatment for the infant. Despite this, nearly half of the infants born to individuals with a reactive syphilis antibody test had non-reactive testing (n=32, 46%). No differences were observed in the number of infants with a reactive RPR test between the groups (p=0.12), although infants born to individuals with a non-reactive RPR were observed to also have a non-reactive RPR when tested.

There was no difference in the number of infants who received penicillin treatment for congenital syphilis (p=0.32), which included either one dose or 10 days of treatment. Four infants were found to have metaphyseal lucencies or periostitis on long bone x-rays. Two infants had neurosyphilis, and one infant died secondary to neurosyphilis complications.

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Discussion

This study highlights the ongoing burden of maternal and congenital syphilis in NM, where structural, systemic, and health education barriers continue to limit access to timely diagnosis and treatment. Many of the individuals in this study were tested for the first time either late in the third trimester of pregnancy or at the time of delivery, both of which are insufficient windows for adequate maternal treatment. A lack of access to healthcare and/or a lack of health literacy are likely contributing factors.

Educational initiatives within the community are desperately needed. More than 75% of U.S. congenital syphilis cases in 2022 involved pregnant individuals with no or inadequate prenatal care, delayed testing, or inadequate/absent treatment.[8] Similarly, about one-third of pregnant individuals in this study had inadequate prenatal care. Improved knowledge may result in individuals prioritizing prenatal care. Collaborative efforts with the NMDOH are ongoing to create flyers with succinct information to be posted around communities, with the goal of improving health literacy. Accessing healthcare will continue to be a major challenge, as NM has a large land mass with low population density. A possible method of increasing access to prenatal care would be through the use of point of care testing or mobile testing units. Mobile screening units have been implemented for several other high-risk diseases (i.e. mobile mammogram units) with great success in improving screening rates.[9] Additionally, eliciting partner information and providing treatment for partners at the same time as treating the pregnant individual could reduce re-infection rates.[10]

This study emphasizes the urgent need to continue working to address missed opportunities for syphilis screening and treatment during pregnancy. A multi-pronged strategy that includes earlier and more stable prenatal engagement, continued rigorous testing protocols, additional social supports, and new educational efforts is essential to protecting maternal and infant health and reducing the significant disease burden of syphilis in NM.

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Competing interests

The authors have no competing interests to disclose.

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