Increased Odds of Psychiatric Illness Among Mothers of Infants with Congenital Syphilis

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BACKGROUND

- Since the late 2000's there has been a dramatic increase in syphilis cases in the United States with a parallel rise in congenital syphilis starting in 2012[1]. This presents a public health concern as syphilis can be transmitted from mother to child during pregnancy, leading to multisystem birth defects and miscarriage if untreated.
- CDC advises screening all pregnant women at first and third trimesters, and at delivery for high-risk populations. In Illinois, screening is mandated at both first and third trimesters.
- University of Illinois Hospital (UIH) in Chicago, IL serves a vulnerable patient population with a high syphilis prevalence[2].
- An understanding of risk factors associated with maternal syphilis infection can guide prevention of CS with early prenatal diagnosis and treatment.
- The aim of this retrospective case control study is to describe maternal risk factors associated with CS in a clinical setting.

METHODS

- Maternal syphilis diagnoses were identified using a database used for local health department reporting at UIH from December 2014 to 2018.
- Medical records of the identified maternal syphilis diagnoses were reviewed for CS infant diagnosis, sociodemographic information, medical history, prenatal course, and potential risk factors, which are listed in Tables 1-2.
- The American Academy of Pediatrics Red Book (2018) Diagnostic Algorithm for Infants Born to Mothers with Reactive Syphilis Serologic Tests was used to determine CS diagnosis.
- Highly probable and possible CS diagnoses were grouped for data analysis because they align with the CDC probable CS case definition. Less likely and unlikely CS diagnoses were grouped because they represent evidence of maternal syphilis infection without meeting the CDC CS case definition.
- Cases were matched with controls of pregnant women who 1) had syphilis testing that was not indicative of infection, and 2) did not have a previous syphilis diagnosis.
- Odds ratios (OR) between CS outcomes and controls were calculated using a 95% confidence interval.
- UIH cases were compared to publicly available Chicago Department of Public Health data (CDPH)[2].

REFERENCES

1. Centers for Disease Control and Prevention. *Sexually Transmitted Disease Surveillance 2018*. Atlanta: U.S. Department of Health and Human Services; 2019
2. Chicago Department of Public Health, 2019. *2019 HIV/STI Surveillance Report*. Chicago, IL: City of Chicago.
3. Wilson, M, Tailor A, Linares A, 2019. *2017 Chicago Community Area Economic Hardship Index.* Chicago, IL: Great Cities Institute, University of Illinois at Chicago.

RESULTS

- Of the 106 maternal syphilis diagnoses identified, there were 8 cases in which CS was highly probable or possible, 68 in which CS was less likely or unlikely, and 30 with an unknown outcome (e.g., lost to follow-up, pregnancy terminated).
- Of the 8 highly probable and possible infants' mothers:
  - 38% had a psychiatric illness (OR = 6.80, CI 1.06-43.48) compared to 8% among controls.
  - 50% had recent substance use (OR = 36.00, CI 3.19-405.9) compared to 3% among controls, which included marijuana in all cases and MDMA in one.
  - Late or scant prenatal care was seen in 75% (OR = 5.54, CI 0.98-31.45) compared to 35% among controls, and 75% had inadequate syphilis treatment.
  - None were HIV-positive or reported incarceration, IV drug use, sex work, or sex with men who have sex with men (MSM).
  - All had Medicaid health insurance and 75% lived in Chicago community areas identified as having a high economic hardship index[3]. 25% were homeless (OR = 12.00, CI 0.94-153.89) compared to 3% among controls.
- Compared to CDPH data, UIH CS cases followed the same general trends in CS incidence city-wide, as seen in Figure 1.

Table 1: Demographic & Obstetric Information
* Average value

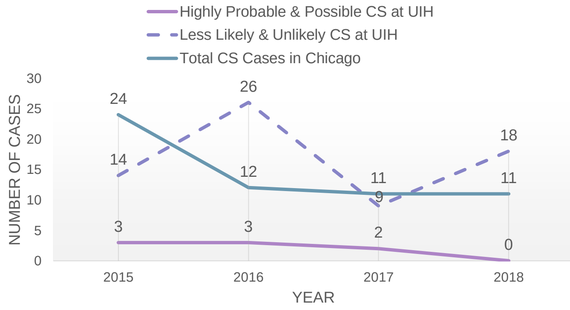
	Highly Probable or Possible CS (n=8)	Less Likely or Unlikely CS (n=68)	Control (n=37)
Mother's age at delivery*	26.13	27.84	26.86
Gravida*	3.88	4.07	2.73
Parity*	2.64	1.96	0.97
Gestational age at birth*	38.13	38.10	38.25
Race & Ethnicity			
Black	**7 (88%) OR 4.26 (0.29-25.54)**	**61 (90%) OR 5.30 (1.90-14.80)**	**23 (62%)**
White	1 (13%)	3 (4%)	5 (14%)
Asian	0 (0%)	1 (1%)	0 (0%)
Other/mixed/unknown	0 (0%)	3 (4%)	9 (24%)
Hispanic or Latina	1 (13%)	3 (4%)	10 (27%)
Foreign born	0 (0%)	3 (4%)	1 (3%)
Health Insurance Type			
Public/Medicaid	**8 (100%)**	**53 (78%)**	**26 (70%)**
Private	0 (0%)	9 (13%)	10 (27%)
None/self-pay	0 (0%)	6 (9%)	1 (3%)

Table 2: Potential Risk Factors Found

	Highly Probable or Possible CS (n=8)	Less Likely or Unlikely CS (n=68)	Control (n=37)
Late or scant prenatal care	**6 (75%) OR 5.54 (0.98-31.45)**	**38 (56%) OR 2.34 (1.02-5.35)**	**13 (35%)**
Prior syphilis diagnosis	3 (38%), 1 inadequately treated	54 (93%), 1 inadequately treated	----
Homeless**	2 (25%) OR 12.00 (0.94-153.89)	6 (9%) OR 3.48 (0.40-30.10)	1 (3%)
Psychiatric Illness**	**3 (38%) OR 6.80 (1.06-43.48)**	**7 (10%) OR 1.30 (0.32-5.36)**	**3 (8%)**
HIV-positive	0 (0%)	3 (4%)	0 (0%)
Other recent STI**	1 (13%)	21 (31%)	8 (22%)
Incarceration**	0 (0%)	2 (3%)	0 (0%)
Sex work**	0 (0%)	0 (0%)	0 (0%)
Anonymous sex**	1 (13%)	0 (0%)	0 (0%)
Sex with MSM**	0 (0%)	0 (0%)	0 (0%)
Substance use**	**4 (50%) OR 36.00 (3.19-405.9)**	**11 (16%) OR 6.95 (0.86-56.12)**	**1 (3%)**
- IV Drug Use**	0	1	0

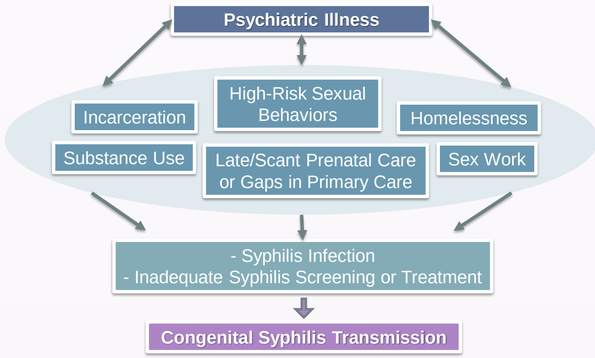
(**) Denotes recent risk factor events defined as occurring within approximately 12 months of when pregnancy began.

Figure 1: Congenital Syphilis Cases by Year at UIH vs. Chicago[2]



DISCUSSION

Figure 2: Theoretical Framework for an Association Between Psychiatric Illness and Congenital Syphilis



- Among infants with highly probable or possible CS, there was a 6.80 increased odds of maternal psychiatric illness compared to those born to mothers not diagnosed with syphilis, which may have complicated prenatal care and delayed diagnosis or treatment.
- Psychiatric illness outnumbered several known risk factors, however, these may be less often discussed or endorsed during clinical encounters. Meanwhile, as illustrated in Figure 2, psychiatric illness is associated with known risk factors, such as substance use, and gaps in primary care, where syphilis can be diagnosed and treated before pregnancy.
- Psychiatric illness may be a risk factor and means to identify women in the clinical setting who need close follow up and outreach after a prenatal syphilis diagnosis to prevent or mitigate congenital transmission.
- A limitation of this study is the low number of cases and statistical power. The cases in this study were also not matched with cases reported to surrounding local health departments. In addition, potential risk factors may not be routinely documented in medical records, the source of data collection in this study. Studies with more CS cases are needed to further investigate the association between psychiatric illness and CS.

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