Elimination of Maternal & Pediatric HIV in Bronx, NY:

Missed Opportunities for Prevention of Mother-to-Child-Transmission in the Era of **U=U**

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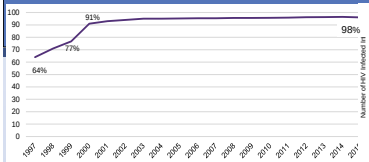


Figure 1. Women living with HIV aware of HIV status prior to delivery. New York State Epidemiologic Profile, 2016

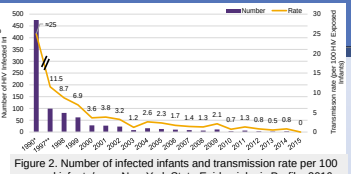


Figure 2. Number of infected infants and transmission rate per 100 exposed infants/year. New York State Epidemiologic Profile, 2016

Delivery Year (Case)	Maternal Hx	Delivery	Infant	Maternal Del VL (copies/mL)	Maternal Dx	Infant Dx	Missed Opportunities
1996 (1)	18yo, married G1P0. Early prenatal care. Good health. HIV test not done. "No risk factors."	NSVD at term. 2450g.	LBW female Otherwise healthy at delivery.	Unknown	After infant diagnosis	P Jirovecii pneumonia at 3 months of age.	No testing offered during pregnancy "per guidelines"
1998 (2)	34yo G1P0 Health Care Professional. HIV test not done. "No risk factors."	NSVD at term. 3200g	Healthy Male.	Unknown	With infant diagnosis.	Failure to thrive at 6 months of age. P Jirovecii pneumonia.	No testing offered during pregnancy "per guidelines"
2007 (3)	28yo G3P2002 term labor, outside prenatal care, on cART, stated VL undetectable.	NSVD With IV ZDV	ZDV to 6w	40,000	Prior to pregnancy	HIV-1 PCR positive at 1 mo	Maternal education? Access to outside laboratory data.
2009 **(4)**	24yo G2P0 at 37w. s/p 7day AP admission for FUO at 34w, HIVAb neg Expedited HIV not done.	NSVD No IV ZDV	No ZDV. HIVAbPos heelstick neonatal screen	Unknown	With Infant Dx	HIV-1 PCR Positive at 2 w	Lack of coordination between care teams. **Maternal PCR not checked.
2013 (5)	**31yo G5P2022 at 34w. Complete PNC, HIVAb/Ag neg 1st tri & 32w.**	**Preterm SVD. No IV ZDV**	**No ZDV. HIVAbPos late NICU screen.**	**Unknown**	**With Infant Dx**	**HIV-1 PCR Positive at 6weeks.**	**Risk factors for PrEP or NPEP not identified. Guidelines & protocols not in place.**
2017 **(6)**	30yo G6P5004, late to PNC at outside clinic. Denied HIV exposure. HIV Ag/Ab neg, L&D expedited HIV neg.	NSVD	Normal neonatal screen	Presumed undetectable	After infant diagnosed	Respiratory failure. P Jiroveci positive ET aspirate at 4mo	Couples testing not standard of care.
2018 **(7)**	23yo G5P2113. Self-identified HIV exposure at 1st prenatal visit. Partner not adherent to cART. nPEP too late		*Still Pregnant*		By maternal VL,confirmed. Maternal HIV-1 Ab remains neg.	Infant remains at increased risk with absence of maternal anti-HIV antibodies.	Preventable sexual transmission. Education regarding U=U, PrEP &PEP. Working with couple's denial.
2019 **(8)**	38yo G1P0 chr htn. Early pregnancy Dx, after infertility eval and gyn surgery		*Still Pregnant*		Prenatal HIV screening.	Prognosis is good.	Same as (7)

Background: A. Blueprint to End the AIDS Epidemic in New York State (NYS):

Historically, one in five persons ever diagnosed with HIV/AIDS in the US lived in NYS. Today, one in ten new US diagnoses occurs in NYS. Of these, 80% come from New York City. Based on principles of expanded access to pre- and post-exposure prophylaxis (PrEP & PEP), early diagnosis, linkage and retention in care aimed enhanced viral suppression, the NYS "Blueprint" was implemented in 2015 with the goal of reducing new HIV infections from 3000/y to 750/y by 2020.[1]

B. Elimination of Pediatric HIV/AIDS: More than 4000 children have been perinatally HIV-infected in New York City since the beginning of the AIDS pandemic. Mother-to-child trans-mission (MTCT) peaked in 1990 when 340 children were born with HIV. In 1997, mandatory, universal newborn HIV screening became law in NYS.[2] Since 2000, more than 90% of pregnant women living with HIV (WLWH) have known their status prior to delivery (Fig 1) and the incidence of pediatric HIV/AIDS has fallen steadily to the single digits but has reached zero only once, in 2015. (Fig 2)

C. Bronx, NY is one of five boroughs of the City of New York. The area of our hospital's postal code has some of the highest all-cause mortality in the US and the highest HIV prevalence in New York State. One in 20 of all US WLHIV lives in the Bronx, where women make up 38% of PLWH. HIV testing and re-testing are performed for more than 98% of our prenatal clients. In 2015, as part of our effort to end HIV/AIDS, BronxCare Health System incorporated the question, "Do you know your partner's HIV Status?" into our standard prenatal questionnaire.

D. Analyses of missed opportunities for prevention of MTCT have focused on investigation of the proportion of women screened for HIV at least twice during pregnancy.[3,4] We report our experience of vertical transmission since 1996, when effective HIV treatment became available in the US.

Objective:

To test the hypothesis that, even though absolutely necessary, by itself, universal HIV screening of pregnant women will not be sufficient for absolute elimination of MTCT of HIV.

Methods:

We performed a retrospective review of local and state data along with medical record review at our institution to identify missed opportunities of HIV transmission prevention among women and children in our community. To compare different eras of treatment/prophylaxis, we selected two cases of MTCT from the 1990s, and identified two cases of MTCT from 2007- 2009, the last year MTCT was > 2% per year in NYS. We identified and reviewed our three diagnosed cases of MTCT since 2010. In addition, we reviewed two cases of confirmed sexual transmission to women during the "pregnancy contemplation" period, to examine missed PrEP/PEP opportunities in this high risk group.

Results:

Six cases of MTCT and two cases of sexual transmission to women planning pregnancy were reviewed (Table).

Cases 1 & 2 occurred in the 1990s. Per guidelines at the time, neither woman was offered HIV testing during pregnancy because of her "low risk" status. Each was diagnosed with HIV infection at the time of her infant's diagnosis of advanced HIV/AIDS.

Case 3 (2007) presented to the Delivery Suite in advanced labor and rupture of membranes of unknown duration, stating she was HIV positive on cART with an undetectable viral load. Prenatal care (PNC) records were not available. The birth infant PCR was negative, then returned positive at 4w.

Case 4 (2009) had 12 PNC visits with negative HIV Ab testing and retesting. Her pregnancy was complicated by a fever of unknown origin, for which she was hospitalized for 7d. Maternal and infant HIV diagnosis was made at 4w of age when the newborn metabolic heelstick screen returned HIV Ab positive.

Case 5 had PNC at our institution. HIV testing/retesting were negative at 11 and 32w. When she presented in preterm labor at 34w, expedited testing was not done. The infant was found to be HIV positive on repeat newborn metabolic disease heelstick screen performed prior to discharge from the NICU at 5w of age.

Case 6 (2017) was a recent immigrant, had 4 prenatal visits at an outside clinic, HIV neg. PNC records were available. Expedited HIV testing in labor was also negative. At 3mo post-partum, our patient presented to the Emergency Room with severe headache and flu-like syndrome. Two days later the infant was evaluated for cough, irritability and poor feeding. At 4mo of age the infant presented in respiratory failure, and she and her parents were diagnosed with HIV by the infant's endotracheal aspirate positive for P Jirovecii pneumonia.

Case 7 (2018) presented for PNC at 10w of amenorrhea. To routine query re: partner HIV status she reported that he was HIV-infected since birth. PEP (TDF/FTC/RAL) was started. Expedited HIVAb and routine HIV1/2 Ag/Ab testing were negative. HIV-1plRNA = 40copies/mL. Repeat testing 2w later was the same. Pt had low adherence to 2nd RAL dose and was switched to DTG once daily. HIV-1 PCR was confirmed by qualitative outside analysis. HIV Ab remains negative and VL is <20 copies/mL.

Case 8 (2018) presented for PNC at 8w of amenorrhea. At 38yo, she had never been pregnant, and actively attempted pregnancy with her known HIV-infected partner for 2y. She was evaluated for infertility, underwent myomectomy 10 mo prior to conception, had negative HIVAb testing, then received bromocriptine for hyperprolactinamia 3 mo prior to conception. She believed she was not at risk for HIV infection. HIV-1 Ab was positive at the 1st PNC visit

Discussion:

Rare MTCT can occur even when maternal HIV testing/retesting rates approach 100%. Women who test negative but are not identified as HIV-exposed before, are at increased risk of acquiring HIV before, during and after pregnancy.

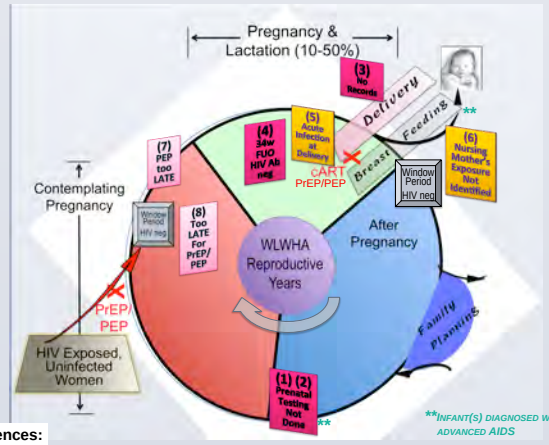
In our worst-case scenario (Case #6), unidentified HIV exposure resulted in undetected maternal acquisition postpartum, and then breast milk MTCT, likely during the window period of high acute maternal viremia and absent maternal anti-HIV Ab. That infant was intubated for more than 1mo and has a guarded prognosis. Case #7 continues pregnant on once-daily cART with improved adherence. HIVplRNA is <20copies/mL and anti-HIV Ab remains negative. **(cont'd→)**

Discussion (cont'd):

Many regions in the US still lag in universal maternal HIV screening during pregnancy.[3] Third trimester retesting was only 28% in one recent report.[4] Thus a major goal of elimination of MTCT remains early and late pregnancy HIV screening. However acute infection during pregnancy or breastfeeding and sexual transmission to women contemplating pregnancy, continue to occur. With the large body of scientific evidence that now supports the concepts of U=U, PreP and PEP, we can no longer accept such events as inevitable.

Conclusions:

1. In the era of U=U, sexual transmission to HIV-exposed women contemplating pregnancy, pregnant or breast-feeding is entirely preventable, but only when their exposure status is known.
2. Rare MTCT will continue to occur among women who test HIV Ab negative under current testing and screening guidelines.
3. Absolute elimination of MTCT will only be possible by prevention of HIV acquisition among women, especially during pre-conception, pregnancy and breast feeding periods.
4. Expanded, universal, on-site, routine HIV exposure screening and couples testing as a standard part of women's health care services, especially PNC and pre-pregnancy/infertility care, will allow us to fully exploit the benefits of PrEP, nPEP and HIV treatment in achieving elimination of HIV/AIDS, and absolute elimination of MTCT.



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