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An innovative approach to triple elimination of mother-to-child transmission of HIV, syphilis and hepatitis B in Viet Nam

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INTRODUCTION

Viet Nam has committed to working towards the elimination of HIV mother-to-child transmission. The stated goals are to reduce the vertical transmission rate of HIV nationally to less than 5% by 2015 and to less than 2% by 2020.

Viet Nam has high hepatitis B virus (HBV) and low HIV and syphilis prevalence among pregnant women. Antenatal care (ANC) coverage is high (one visit 96,6%, three visits 87.5%)*. Prevention of mother-to-child-transmission (PMTCT) of HIV and infant hepatitis B immunization are managed by separate vertical programmes and services. It is national policy that free provider-initiated universal HIV testing is recommended to pregnant women (PW). Syphilis and hepatitis B testing are not routinely offered. This study aims at demonstrating an innovative model of combined universal screening for HIV, syphilis, and HBV for PW and treatment of infected PW in ANC to prevent vertical transmission of three infections.

*Maternal Child Health annual report 2013, Health Statistics Yearbook 2013.

METHODS

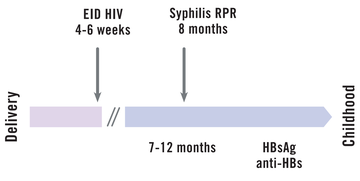
Site and time: All 18 communes, Pho Yen district, Thai Nguyen province, Viet Nam (October 2012 to June 2014).

Participants: Pregnant women who live in Pho Yen District and attended ANC (October 2012 – June 2013).

Interventions:

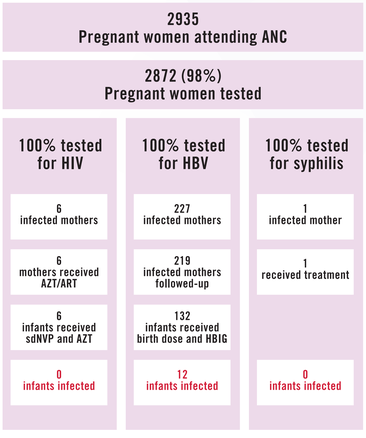
- **All PW were offered HIV, HBV, and syphilis testing during ANC visits and their exposed infants during maternal child health clinic visits** (**Figure 1**). Blood specimens were collected at commune health stations during ANC visit and transferred to district health centre for testing of HIV, syphilis and HBV using rapid diagnostic assays.
  - HIV-positive specimens were sent to Thai Nguyen Provincial AIDS Center laboratory for confirmation (using Murex HIV Ag/Ab Combination, Serodia-HIV1/2 mix and Determine-HIV1/2).
  - RPR-reactive specimens were sent to Provincial Dermatology and Venereology Department for confirmation (using TPHA).
  - HBsAg-positive specimens were sent to National Institute for Hygiene and Epidemiology (NIHE) for HBeAg and HBeAb (using Monolisa HBeAg-Ab plus).
- **Combined triple PMTCT interventions**:
  - Prevention of HIV transmission: AZT and single dose nevirapine (sdNVP) for PW from 14th week gestation; sdNVP plus four weeks of AZT and infant formula for exposed infants.
  - Syphilis treatment: Benzathine penicillin to PW and infected infant.
  - Prevention of HBV transmission: Four dose HBV vaccination (including birth dose) as recommended in national guidelines plus optional HBV immunoglobulin (HBIG) for exposed infants.
- **Data collection and analysis**:
  - Data on testing uptake, immunizations and interventions for pregnant women and their infants were collected from commune and district records.
  - Maternal age, parity, mode of delivery, infant gender, and infant birth weight data were collected during post-natal visits for infant HBV testing.
  - Descriptive analysis was conducted to estimate prevalence.
  - Logistic regression analysis was conducted to establish whether the administration of birth dose and HBIG was significantly associated with HBV transmission from mother-to-child.

Figure 1. Timing of infant diagnosis for HIV, syphilis and HBV



RESULTS

Figure 2. Mother and infant outcomes



- **Prevalence of HIV, HBV and syphilis**: From October 2012 to June 2013, 98% of 2872 pregnant women attending ANC were tested for HIV, HBsAg and syphilis (**Figure 2**). The prevalence rates of HIV, HBsAg and syphilis were 0.02%, 8% and 0.03%, respectively.
- After controlling for maternal age, parity, mother's HBeAg and HBeAb status, and birth weight, the admnitration of both birth dose and HBIG to infants was significantly associated with reduced risk of HBV transmission (77%) (**Table 2**).
- 72% of infants born to HBV infected mother received birth dose vs 33.5% of all infants born to HBV infected and born to HBV uninfected mothers in Pho Yen district during study period.

Table 1. Univariate analysis of factors associated with HBV transmission from mother-to-child

Variables		Infant's HBsAg status		OR (95%CI)	P-value
		Negative	Positive		
Mother's HBeAg status	Negative	106	5	referent	<0.001
	Positive	52	24	9.9 (3.6–27.4)	
Mother's HBeAb status	Negative	61	25	referent	<0.001
	Positive	94	4	0.1 (0.03–0.30)	
Infants received both HBIG and birth dose	No*	55	18	referent	
	Yes	110	12	0.33 (0.15–0.74)	0.007
Parity	≤2	63	18	referent	0.04
	>2	95	11	0.44 (0.20–0.97)	
Birth weight	<2500	8	4	referent	0.07
	≥2500	150	25	0.30 (0.08–1.1)	

* Infants with only birth dose or only HBIG, or neither birth dose nor HBIG

Table 2. Multivariate analysis of factors associated HBV transmission from mother-to-child*

Factors		Adjusted off ratio*	95% CI	P-value
Infant received both HBIG and birth dose	No[§]	Referent		
	Yes	0.23	0.08–0.64	0.005

* The model was adjusted for mother's age, and HBeAb and HBeAg status, parity, and birth weight
§ Infants with only birth dose or only HBIG, or neither birth dose nor HBIG

CONCLUSION

- **Integration of routine provider-initiated HIV, syphilis and HBV testing into maternal child health services is feasible. The uptake of testing for all three infections in this study was very high.**

Our findings confirm that administration of HBV birth dose immunization to infants reduces the risk for HBV transmission. Investment in HBV screening for PW and providing HBV birth dose vaccine and potentially HBIG for infants reduces HBV infection among newborns in a country with high hepatitis B prevalence. Introduction of antivirals for high risk pregnant women may further decrease HBV transmission risk, which will rely on uptake of testing.

Ab antibody, Ag antigen, ANC antenatal care, EID early infant diagnosis (HIV), HBeAb hepatitis B e antibody, HBeAg hepatitis B e antigen, HBIG hepatitis B immunoglobulin, HBsAg hepatitis B surface antigen, HBV hepatitis B virus, PMTCT prevention of mother-to-child transmission, PW pregnant women, RPR rapid plasma regain, sdNVP single dose nevirapine, TPHA Treponema pallidum haemagglutination assay.

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