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### Authors

Yeganeh, Nava  
Simon, Mariana  
Dillavou, Claire  
[et al.](#)

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## HIV Testing Male Partners of Pregnant Women in Porto Alegre, Brazil: A Potential Strategy for Reduction of HIV Seroconversion during Pregnancy

Nava Yeganeh<sup>\*</sup>, Mariana Simon<sup>^</sup>, Claire Dillavou<sup>+</sup>, Ivana Varella<sup>^</sup>, Breno Riegel Santos<sup>^</sup>, Rosana Fonseca<sup>^</sup>, Marineide Melo<sup>^</sup>, Rita Lira<sup>^</sup>, Pamina Gorbach<sup>+</sup>, and Karin Nielsen-Saines<sup>\*</sup>

<sup>^</sup>Hospital Nossa Senhora da Conceição/GHC, Porto Alegre, Brazil. Serviço de Infectologia Hospital Nossa Senhora da Conceição/GHC, Av. Francisco Trein, 596, 91350-200 Porto Alegre, RS Brasil, Telephone: +55-51-3341-5316, Fax: +55-51-3343.2386

<sup>\*</sup>Dept of Pediatrics, David Geffen School of Medicine at UCLA, Los Angeles, CA, United States. Division of Infectious Disease-MDCC 22-442 10833 LeConte Ave, Los Angeles, CA 90095. Telephone 310 825-5235. Fax 310 825-9175

<sup>+</sup>Department of Epidemiology, Fielding School of Public Health at UCLA, Los Angeles, CA United States. CHS 41-295, Box 951772, Los Angeles CA 90095. Telephone 310-794-2555, Fax 310-825-7387

### Abstract

Pregnant women have a significantly higher risk of HIV acquisition during gestation than their non-pregnant counterparts due to behavioral and biological factors. Acute seroconversion during gestation results in increased HIV mother-to-child transmission rates and has been identified as a major public health challenge. In order to address potential HIV seroconversion in our pregnant patients, we conducted a prospective cohort study to evaluate the acceptability of offering HIV testing to sexual partners of HIV-negative pregnant women receiving antenatal care at 2 hospitals in Porto Alegre, Brazil. Over a 14 month study period, HIV-negative pregnant women at two hospital-based clinic sites were encouraged to bring their stable sexual partner for HIV voluntary counseling and testing during prenatal care. Women were re-interviewed following delivery to measure success of the intervention. Of the 1223 HIV-negative pregnant women enrolled in the study, 663 (54%) of their male sexual partners received HIV testing during antenatal care and 4 (0.6%) were diagnosed with HIV infection. Six hundred and forty five women were interviewed at the time of delivery, with 620 (97%) confirming that HIV testing was suggested to their partner. The most common reason provided by women as to why partners did not come for testing was work (69%) and lack of perceived risk (14%). Independent predictors of successful partner testing included being white (OR 1.59, 95% CI 1.18–2.12), married (OR 1.78, 95% CI 1.08–2.94), having an older age of sexual debut (OR 0.94, 95% CI 0.9–0.98), and being recruited at Hospital

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Correspondence/Address for Reprints: Nava Yeganeh MD, MPH, Dept of Pediatrics, David Geffen School of Medicine at UCLA, Los Angeles, CA, United States. Division of Infectious Disease-MDCC 22-442 10833 LeConte Ave, Los Angeles, CA 90095. Telephone 310 825-5235. Fax 310 206-4764, nyeganeh@mednet.ucla.edu.

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Conceição (OR 2.1, 95% CI 1.52–2.88). We conclude that HIV partner testing during prenatal care is acceptable, rendering this intervention attractive to public health programs targeting prevention of sexually transmitted infections.

### Keywords

Partner testing; acute seroconversion; pregnancy; prevention of mother to child transmission

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## INTRODUCTION

It is well established that pregnant women are at a significantly higher risk of HIV acquisition during pregnancy and breastfeeding than their non-pregnant counterparts.(Gray et al., 2005; Mugo et al., 2011) Research done in several low and middle income countries show that despite universal antenatal testing, HIV infected babies are born to women who had negative HIV tests during prenatal care, implicating seroconversion during pregnancy. (Moses, Tosswill, Sudhanva, Poulton, & Zuckerman, 2008; Nielsen-Saines et al., 2008; Struik et al., 2008) Because of this concern, HIV testing of women at the time of labor and delivery has been implemented at the Grupo Conceição, a large public medical group located in Porto Alegre, the capital and largest city in the Brazilian state of Rio Grande do Sul. Porto Alegre has the highest rate of AIDS cases in the country with an HIV prevalence of 3–5% of women in prenatal care and 5–10% of women without prenatal care.(SUS & Prefeitura Municipal de Porto Alegre, 2012) By testing women twice during gestation, we found moderately high rates of HIV mother to child transmission (MTCT) of 0.8 per 1000 with acute seroconversion during pregnancy with subsequent increased MTCT of HIV to infants; a finding replicated in multiple other countries.(Gay et al.; Kinuthia et al., 2010; Liang et al., 2009; Lu et al., 2009; Marinda et al., 2011; Moodley et al., 2011; Nielsen-Saines et al., 2008). Prior studies evaluating HIV testing of male partners have had low rates of success with partner uptake ranging from <2% in Uganda to 35% in India.(Kizito et al., 2008; Orne-Gliemann et al., 2013) We evaluated the acceptability of offering HIV rapid tests to partners of pregnant women with the end goal of improving the health of children by both preventing sexual transmission of HIV to pregnant women and subsequent transmission to the baby, and by protecting the father's health with early diagnosis and treatment.

## METHODS

Using a prospective cohort study design, we recruited a convenience sample of HIV-negative women presenting for routine prenatal care who fulfilled the following eligibility criteria: 18 years of age and older, pregnant, currently in a steady heterosexual relationship (> 3 months), attending prenatal care at either Hospital Femina or Hospital Conceição from September 2010 to November 2011. All pregnant women attending prenatal care visits at both centers were screened, and if eligible, consented for study participation.

At the initial visit, participants were interviewed about demographics and behavioral risk factors via either face-to-face or audio computer-assisted survey interviews (ACASI). Differences in results based on interview technique are reviewed in a different publication. (Yeganeh et al., In Press) Interview questions were identical with scripted answers for both

FTF and ACASI. At the end of the interview, women were informed of the benefits of involving their partners in HIV testing and asked to invite their male partners to come to the clinic for HIV testing. They were given a card stating “Protect your baby, test the father for HIV” on the front and had detailed instructions ways to obtain HIV testing on the back including a contact phone number. Women were encouraged to bring their partners in for testing at their next prenatal visit or to have the partner come in to the clinic by himself.

Women who delivered at Conceição or Femina and were successfully identified as study participants by hospital staff, completed a second questionnaire via the same method as their initial interview (FTF or ACASI) asking about acceptance or rejection of partner HIV testing. If a woman stated their male partner had received testing, our survey prompted for potential adverse outcomes.

Male partners of participating women who came to the clinic were consented by study personnel and offered confidential HIV counseling and rapid testing (Determine Rapid Test Abbott Laboratories) and were interviewed in the same manner as their partners (ACASI or FTF) regarding potential HIV risk factors while awaiting test results. Couples found to be serodiscordant were immediately offered enrollment into our HIV serodiscordant clinic and monitored closely throughout pregnancy and breastfeeding. Trained study personnel conducted participant recruitment, survey administration and HIV rapid testing.

Descriptive statistics were performed for all data collected. Two-sample t-test and Pearson chi-square statistics were used to analyze continuous and categorical outcomes, respectively. Univariate and multivariate logistic regression was performed to assess predictors associated with uptake of partner testing. All computations were done using STATA version 11.1. (Cary, NC). IRB approval was obtained through both the UCLA and the Grupo Conceição Institutional Review Boards.

## RESULTS

During the study period, 1376 women were approached to enroll in the study. Seventy eight women refused participation and 1223 women provided informed consent for study participation with 872 women enrolling at Hospital Conceição and 351 women enrolling at Hospital Femina.

Table 1 outlines the socio-demographic characteristics of the study population. The mean age of pregnant women was 29 years, with a monthly household income of 1422 Brazilian Reais (650 US dollars). Seventy four percent of participants self-identified themselves as white, which is representative of the racial composition of the population of Porto Alegre.

Figure 1 outlines the enrollment cascade of study participants. Of the 1223 women enrolled in the study, 1186 (97%) women agreed to ask their partners to receive HIV testing. Fifty six percent (n=663) of partners complied with the request and received HIV VCT with a participation rate of 59% (n=518) at Hospital Conceição and 41% (n=354) at Hospital Femina. Four men (0.6%) were newly diagnosed with HIV-infection. All infected partners stated that they rarely used condoms during sexual activity and one admitted to outside sexual partnership during pregnancy. Each HIV infected man was referred to the onsite

serodiscordant clinic, and no HIV transmission to partners was observed during pregnancy or breastfeeding of their partner in the study.

The second interview was conducted with 645 women who delivered at our study institutions to evaluate the response to the intervention. Nearly all women (97%) stated they discussed testing with their partners, but only 40% (n = 255) confirmed they were certain their partners had received HIV VCT. Within this group of 255 women who stated that partners had received testing, 238 (93%) partners were confirmed to have received testing at our clinic during prenatal care.

During the second interview, women whose partners did not come to be tested were asked why partners did not comply with the request. As seen in Table 2, the most commonly prompted answer (69%) was inconvenience for men to attend prenatal care due to work or distance.

Factors hypothesized to affect uptake of the partner testing intervention were evaluated in univariate and multivariate analyses (Table 3). Independent predictors of successful partner testing included being white (OR 1.59, 95% CI 1.18–2.12), married (OR 1.8, 95% CI 1.08–2.94), and having an older age of sexual debut (OR 0.94, 95% CI 0.9–0.98).

## DISCUSSION

Our study demonstrated that pregnant women in the south of Brazil feel comfortable discussing HIV testing with their partners and recommending that they obtain HIV VCT. More than half of the partners of HIV negative women in prenatal clinics were tested for HIV. This percentage is substantially higher than most other published studies in South and East Africa including 2% in Uganda (Kizito et al., 2008), 3% in Tanzania, (Falnes et al., 2011) 15% in Kenya (Farquhar et al., 2004) and 13% in Cote d'Ivoire. (Desgrees-Du-Lou et al., 2009) The higher rate of male participation may have occurred for multiple reasons, including most other studies were performed in low income countries, whereas Brazil is considered middle income with a relatively strong health system with >95% of women having at least one prenatal care visit and receiving HIV testing. (The World Bank, 2010) We could not find published reports of comparable partner testing strategies in Latin America.

The most commonly given reasons for non-testing included partner unavailability due to work and a perceived low risk of HIV infection by the men. Other studies have suggested that men may display reluctance in attending antenatal care as this is viewed as the woman's responsibility, and going to visits are "unmanly." (Falnes et al., 2011) Our participants did not endorse these opinions, but we did not directly interview men who refused participation and instead interviewed the pregnant women as a proxy during the time of labor and delivery. In the future, alternative strategies including motivational interviewing, at home testing, and mobile van testing should be considered to enhance male participation.

As noted in Table 3, marriage predicted partner testing. Marriage status may represent a level of social intimacy that enabled women to have greater influence upon their spouse regarding matters of health. Race is likely a marker of socio-economic status and level of

education especially in the city of Porto Alegre, where the majority of the population is white because of immigration patterns, while non-whites are a minority who tend to have lower socio-economic status. There is concern that women whose partners did not get testing may be at the highest risk for HIV acquisition since their relationships may be more transient. Ideally, we would be able to offer this intervention to all women, but with a special focus on pregnant women living in the most vulnerable groups including those who use drugs, work in the sex-trade industry, and live in areas with high HIV prevalence rates. We conclude that partner testing could potentially address the serious problem of maternal seroconversion during pregnancy, but larger scale trials are needed to prove its efficacy.

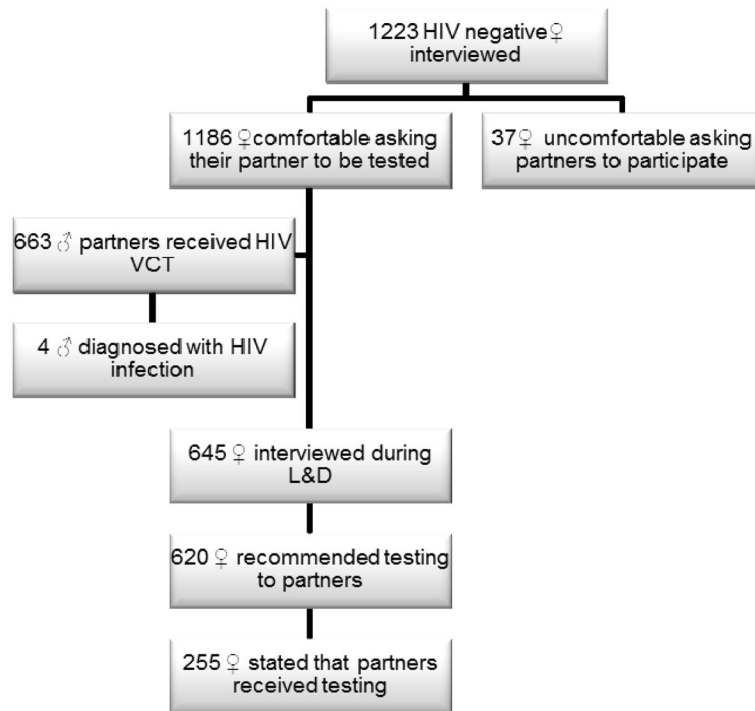
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**Figure 1.** Enrollment diagram showing enrollment of all participants in our partner testing intervention.



**Table 1**

Demographics of women participating in prenatal intervention (n=1223)

Characteristic	N (% or SD)
AGE (years)	29 (± 6.7 yrs)
YEARS OF EDUCATION (years)	9 (±3.1)
MONTHLY HOUSEHOLD INCOME	
(Reals)	R\$1422 (± 1751)
(US Dollars)	\$650 (±803)
RACE	
White	903 (74%)
Black/Afro-Brazilian	195 (16%)
Mulatto/Mixed	113 (9%)
Indigenous	2 (0%)
MARITAL STATUS	
Married (Legal or Common-law)	1115 (92%)
Single	102 (8%)
LENGTH OF RELATIONSHIP	
3 mo-1 year	153 (13%)
1-5 years	483 (40%)
>5 years	580 (48%)
GRAVIDITY	2.9 (±1.7)

**Table 2**  
Reasons given by women at labor and delivery for partners not being tested (n=373)\*

	N (%)
Inconvenience because of work/distance	257 (69%)
Partner does not feel at risk for HIV	52 (14%)
Partner does not think HIV testing is important	34 (9%)
Partner is afraid of needle/test/result	32 (8%)
Partner is unavailable because he is in jail	10 (3%)

\* Participants can choose more than one response

**Table 3**

Univariate and multivariate logistic regression analysis comparing demographic and behavioral characteristics of pregnant women whose partners received HIV testing versus women whose partners refused HIV testing

	Partner received HIV VCT (n=663)	Partner did not receive HIV VCT (n=560)	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)**
<b>Women's First Interview—Prenatal Care</b>				
Mean Age (years)	29.4 (±6.78)	29.4 (±6.67)	1 (0.98–1)	
Race				
White	518 (78%)	385 (69%)	1.59 (1.23–2.06)*	1.59 (1.18–2.12)*
Other	142 (22%)	164 (30%)		
Marital Status				
Married (Legal or Common-law)	622 (94%)	493 (88%)	2.12 (1.4–3.22)*	1.8 (1.08–2.94)*
Other	38 (6%)	64 (11%)		
Mean years of schooling (years)	9.1 (±3.18)	8.9 (±2.97)	0.97 (0.94–1.01)	1 (0.96–1.05)
Mean household income (R\$)	1385	1465	1 (0.99–1)	
IV drug use (yes)	4 (1%)	8 (1%)	0.7 (0.22–2.19)	0.71 (0.19–2.6)
Alcohol use (yes)	78 (12%)	64 (11%)	1.03 (0.72–1.47)	
Mean age of sexual debut	16.5 (±3.09)	16 (±2.71)	0.94 (0.9–0.98)*	0.95 (0.9–0.98)
Pregnancy condom use (never)	556 (84%)	438 (78%)	1.6 (1.19–2.21)*	1.36 (0.94–1.98)
Sexual activity (yes)				
Vaginal Sex	615 (93%)	524 (94%)	0.83 (0.54–1.27)	
Oral Sex	263 (40%)	195 (35%)	1.22 (0.97–1.55)	1.13 (0.82–1.57)
Anal Sex	125 (19%)	96 (17%)	1.12 (0.83–1.5)	
Outside sexual partnerships/affairs (yes)	25 (4%)	33 (6%)	0.62 (0.37–1.06)	0.77 (0.42–1.43)

	Partner received HIV VCT (n=663)	Partner did not receive HIV VCT (n=560)	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)**
Interview type				
Face to face	537 (81%)	415 (74%)	0.67 (0.51–0.88)*	0.99 (0.63–1.56)
ACASI	126 (19%)	145 (26%)		
Study site				
Conceição	518 (78%)	354 (63%)	2.08 (1.62–2.67)*	2.1 (1.52–2.88)*
Femina	145 (22%)	206 (37%)		

\* p value<0.05

\*\* Adjusted for covariates with a P value<0.2, including race, marital status, years of schooling, IV drug use, condom use during pregnancy, engaging in oral sex pregnancy, having outside relationships during pregnancy, interview type and study site.