Pregnancy and HIV Infection in Young Women in North Carolina

Elizabeth A. Torrone, MSPH, PhD[a]
Janell Wright, MPH[a]
Peter A. Leone, MD[b,c]
Lisa B. Hightow-Weidman, MD, MPH[b]

SYNOPSIS

Objectives. We described young women in North Carolina (NC) who were pregnant at the time of diagnosis with human immunodeficiency virus (HIV) infection to identify an at-risk population that could be targeted for increased HIV screening. We investigated the combined effect of partner counseling and referral services (PCRS) and comprehensive prenatal HIV screening.

Methods. We conducted a retrospective review of PCRS charts on young women newly diagnosed with HIV in NC between 2002 and 2005. We determined the prevalence of pregnancy in the study sample and conducted bivariate analyses to assess predictors of pregnancy at the time of HIV diagnosis, calculating prevalence ratios (PRs) with 95% confidence intervals (CIs). We analyzed results of partner notification efforts, including timing and stage of diagnosis of HIV-positive partners.

Results. During the four-year period, 551 women aged 18–30 years were newly diagnosed with HIV; 30% were pregnant at the time of HIV diagnosis. Pregnant women were more likely to be Hispanic (PR=1.58, 95% CI 1.15, 2.17) and not report typical risk factors. Fourteen percent of pregnant women's partners had an undiagnosed infection compared with slightly more than 8% of nonpregnant women's partners ($p<0.01$).

Conclusions. Ethnic differences in co-diagnosis of pregnancy and HIV suggest that young Hispanic women may have differential access to and acceptance of routine HIV screening. Comprehensive prenatal screening combined with partner notification can be effective in reaching infected male partners who are undiagnosed.

[a]University of North Carolina at Chapel Hill, Gillings School of Global Public Health, Chapel Hill, NC

[b]University of North Carolina at Chapel Hill, School of Medicine, Chapel Hill, NC

[c]North Carolina Department of Health and Human Services, Communicable Disease Branch, Raleigh, NC

Address correspondence to: Elizabeth A. Torrone, MSPH, PhD, University of North Carolina at Chapel Hill, Gillings School of Global Public Health, Department of Epidemiology, CB# 7435, Chapel Hill, NC 27599; tel. 404-639-8948; fax 404-639-8610; e-mail <torrone@email.unc.edu>.

Many women in the United States are not routinely tested for human immunodeficiency virus (HIV).[1] Health-care providers may not offer HIV tests due to policies (e.g., inadequate reimbursement) or logistics (e.g., time constraints)[2] and, prior to 2006, recommendations of risk-based screening.[3] Women may not request and/or accept tests due to fear of testing positive or a low perception of risk,[4,5] particularly women who are in relationships.[6] Routine testing during prenatal care increases testing opportunities for women. In the 2006 National Health Interview Survey, more than 60% of women who were pregnant at the time of the interview reported an HIV test in the last year compared with less than 13% of all nonpregnant women.[1] Women who are diagnosed with HIV during pregnancy represent a population that may have previously had decreased access to routine HIV testing and/or a low perception of risk. Routine screening during prenatal care reduces mother-to-child transmission[7] and, when combined with a partner referral and notification program,[8] may provide opportunities to reach disenfranchised partners and decrease delayed diagnoses.

Currently, the Centers for Disease Control and Prevention (CDC) provides separate guidance for HIV testing, counseling, and referral in the U.S., including testing of pregnant women[9] and partner referral services.[10] Previous research has examined routine testing of pregnant women[11–15] and reported on partner notification programs,[16–19] but no studies have examined the combined efforts of both CDC recommendations. Using statewide HIV records on young women newly diagnosed with HIV in North Carolina (NC), we examined the combined effect of NC's testing and referral services programs on young women and their partners.

METHODS

As part of an ongoing investigation of HIV in young adults in NC,[20–23] we conducted a retrospective review of available state HIV epidemiologic records on all women aged 18–30 years with newly diagnosed HIV infection in NC between 2002 and 2005. Data were abstracted from partner counseling and referral services (PCRS) records. PCRS counselors, also called disease intervention specialists (DISs), conduct voluntary, post-diagnosis interviews with all individuals with reported cases of HIV and syphilis (index cases).

During the interview, the PCRS counselor conducts a risk assessment, provides risk reduction information, and makes referrals for medical care and case management. Additionally, the PCRS counselor reviews communicable disease control measures that document the legal requirement to notify past partners. The PCRS counselor elicits names and locating information on all sex and needle-sharing partners (contacts), working with the index patient to conduct partner notification. All contacts to the index case are informed of possible exposure and offered both HIV and syphilis testing, either in a clinic or in the field. All information on both the index case and contacts is documented in STD*MIS, a CDC standardized electronic database, and in hard copy paper charts stored in secure locations across the state. Data recorded on the index case include demographics, risk behaviors, lab results, and testing history. The PCRS counselor follows up with all contacts and documents test uptake and results.

A review of NC's PCRS program in 2001 indicated that nearly 90% of all new cases of HIV were interviewed by a PCRS counselor. The proportion of patients not able to be located did not vary by age or race/ethnicity, although patients tested in a public clinic were more likely to be located. Approximately 87% of contacts identified were located, and 64% of those not already diagnosed with HIV were tested following notification.[17]

Using a case abstraction form, trained research assistants abstracted data from the standardized fields, as well as the narrative sections of the PCRS case reports. Data were entered into a Microsoft® Access database.[24] Using unadjusted prevalence ratios (PRs) and 95% confidence intervals (CIs), we identified characteristics of women diagnosed while pregnant to determine an at-risk population that could be targeted for increased HIV screening. We examined women's demographics (e.g., age and race/ethnicity), testing history, stage at diagnosis, and risk behaviors for associations with a concurrent HIV diagnosis and pregnancy. We defined a recent/acute diagnosis as either (*1*) a reactive test with a documented negative test in the last six months or (*2*) a ribonucleic acid (RNA) positive test with a concurrent antibody negative test. We defined late diagnosis as an acquired immunodeficiency syndrome (AIDS) diagnosis at first HIV test. Risk factors included number of sex partners, sex partner characteristics, and drug use. We classified the latter as use of any recreational drug (not including alcohol use only) and injection drug use (IDU).

We described results of partner notification efforts including testing uptake by contacts and percent positivity of those testing. After linking contacts to the female index cases, we examined timing and stage of diagnosis of HIV-positive partners, testing to see if there were differences by pregnancy status of the female index case. To account for non-independence of male

cases (nine men were named as positive partners to multiple women), we used clustered regression analysis when testing for statistical differences. We conducted data analyses using SAS® software version 9.1.[25]

This study was approved by the University of North Carolina at Chapel Hill Nursing-Public Health Institutional Review Board.

RESULTS

During the four-year period, 551 women aged 18 to 30 years with available PCRS records were newly diagnosed with HIV in NC; 166 (30.1%) were diagnosed while pregnant (Table 1). Women who reported exchanging sex for drugs/money (PR=0.55, 95% CI 0.30, 1.01) or using recreational drugs not including alcohol (PR=0.72, 95% CI 0.43, 0.96) were less likely to be pregnant at the time of HIV diagnosis. Women who were co-diagnosed with HIV and AIDS were less likely to also be pregnant at the time of diagnosis (PR=0.55, 95% CI 0.28, 1.09). Hispanic women were more likely to be diagnosed while pregnant (PR=1.58, 95% CI 1.15, 2.17). Only 11.5% of Hispanic pregnant women reported a previous HIV test compared with 30.0% of non-Hispanic pregnant women (p=0.05) (data not shown).

Nine hundred and forty sexual partners were named during PCRS counseling. On average, pregnant and nonpregnant women reported similar numbers of sexual contacts during partner notification (mean=1.8, standard deviation [SD] = 1.6; mean = 1.7, SD=1.6, respectively; p=0.4). Similarly, we found no statistical differences in the percentage of partners located by pregnancy status of the index case (Figure). We identified 196 HIV-positive male partners with either previously known infections or new diagnoses. Nine of the infected men (previously and newly diagnosed) were named as partners to multiple women. Six men were each contacts to two women, and three men were each contacts to three women for a total of 21 women involved (3.8% of the total population of women). Nine of the 21 women were pregnant (5.4% of the pregnant population). There were no differences in prevalence of infected partners found through contact tracing by pregnancy status; 32.5% of nonpregnant women (n=54) and 36.6% of pregnant women (n=141) had infected partners. However, pregnant women were more likely to have undiagnosed partners compared with nonpregnant women; 30 men newly diagnosed after contact tracing (14.0% of partners located) vs. 38 men (8.4% of partners located), respectively (p<0.01).

Comparing dates of diagnosis, more than half of pregnant women were diagnosed prior to their partner compared with 22.0% of nonpregnant women (p<0.01) (Table 2). When women were diagnosed first, HIV-positive contacts of pregnant women were subsequently diagnosed more quickly compared with nonpregnant women. Partners of pregnant women were diagnosed a mean of 63 days following the index female case's reactive test (interquartile range [IQR] 22, 98) vs. a mean of 122 days (IQR 23, 142) for partners of nonpregnant women (p=0.07). Among all women in the cohort, when men were diagnosed first, they had been notified of their infection a mean of 1,240 days (3.4 years) (IQR 60, 2,324) prior to the female's diagnosis. There was no difference in length of time before the women's diagnosis by pregnancy status.

Among all women in the cohort, when women were diagnosed first and their positive male partner was diagnosed through contact tracing, more than 75.0% of infected partners had never been tested and 13.3% already had progressed to an AIDS diagnosis. There were no statistical differences in partner's stage at diagnosis or testing history by pregnancy status of female index case.

DISCUSSION

We used statewide data abstracted from PCRS charts to examine characteristics of women newly diagnosed with HIV in NC, documenting differences in patient characteristics by pregnancy status at time of diagnosis. Women diagnosed with HIV during pregnancy did not report typical risk factors, such as drug use and high-risk sexual behavior. This finding suggests that there are few identifiable screening predictors, and lends support to universal HIV testing during prenatal care. Additionally, it underscores the need for testing at routine health-care visits prior to pregnancy care. Women who were diagnosed while pregnant were less likely to have progressed HIV disease (indicated by an AIDS diagnosis at the time of testing), suggesting that routine testing can help identify infections at an early stage.

Ethnic differences in co-diagnosis of pregnancy and HIV and in previous testing history suggest young Hispanic women may not be routinely accessing testing outside of prenatal care. Barriers may include low-risk perception,[26] perceived stigma, fatalistic beliefs,[27] lack of knowledge about treatment availability,[28] and difficulty accessing services.[29] However, these barriers are likely context-specific and may depend on local clinic characteristics (e.g., availability of translators) and on the prevalence of local prevention and outreach testing programs. Formative research should be undertaken

Table 1. Characteristics of women aged 18 to 30 years with newly diagnosed HIV infection by pregnancy status at time of diagnosis, North Carolina, 2002–2005

Characteristics	N	*Percent pregnant*	*Prevalence ratio (95% CI)*
Total	551	30.1	
Demographics			
Age (in years)			
26–30	245	25.7	0.76 (0.58, 0.99)
18–25	306	33.7	1.0
Race			
White	124	31.5	1.05 (0.78, 1.41)
Other	20	20.0	0.67 (0.27, 1.62)
Black	406	30.0	1.0
Ethnicity			
Hispanic	58	44.8	1.58 (1.15, 2.17)
Non-Hispanic	493	28.4	1.0
Testing and diagnosis			
HIV stage at diagnosis			
Recent/acute	29	24.1	0.77 (0.40, 1.49)
AIDS	44	20.5	0.65 (0.36, 1.18)
Chronic	478	31.4	1.0
Previous test			
Yes	134	33.6	1.07 (0.80, 1.42)
Unknown	96	31.3	0.99 (0.71, 1.39)
No	321	31.5	1.0
Late diagnosis[a]			
Yes	41	17.1	0.55 (0.28, 1.09)
No	510	31.1	1.0
Reported risk factors			
Exchanged sex for drugs/money			
Yes	52	17.3	0.55 (0.30, 1.01)
No	499	31.5	1.0
Used recreational drugs[b]			
Yes	195	24.1	0.72 (0.43, 0.96)
No	356	33.4	1.0
Injection drug use			
Yes	14	21.4	0.71 (0.26, 1.94)
No	537	30.4	1.0
Partner characteristics			
Sex with injection drug user			
Yes	16	18.8	0.62 (0.22, 1.72)
No	535	30.5	1.0
Sex with bisexual man			
Yes	10	50.0	1.68 (0.89, 3.16)
No	541	29.8	1.0
Sex with HIV+ partner			
Yes	34	32.4	1.08 (0.65, 1.79)
No	517	30.0	1.0

[a]AIDS diagnosis at first HIV test

[b]Not including alcohol use only

HIV = human immunodeficiency virus

CI = confidence interval

AIDS = acquired immunodeficiency syndrome

prior to intervention development. Qualitative methods, including focus groups and in-depth interviews, have been used to identify barriers to other HIV prevention efforts[30–32] and may be useful in developing targeted testing programs.

By linking abstracted data on the female index cases to their sexual partners, we also examined the effects of the PCRS partner notification efforts. In this sample, contact tracing and notification identified undiagnosed infections in male partners, including many cases that reported no previous testing and were in the late stages of disease (i.e., AIDS). Although there were no differences in the stage of the partner's diagnosis, pregnant women were more likely to have undiagnosed, positive partners than nonpregnant women. This finding suggests that the combination of comprehensive prenatal screening with partner notification can be effective in reaching infected individuals who are undiagnosed. However, among all women, the majority of positive male partners were told of their infection prior to the woman's diagnosis. It is unclear if the prolonged time lag between diagnoses was a result of men's undisclosed status to female partners or their partner's acceptance of risk and/or decision not to test following initial partner notification. This finding highlights the need to understand both testing practices and post-diagnosis risk behaviors, as well as create opportunities for prevention with positives, such as clinic-based interventions,[33] prevention case management,[34] and group-level interventions.[35]

Limitations

We made efficient use of routinely collected statewide data on newly infected women; however, this analysis had several limitations. We included only charts of index patients who were able to be contacted and interviewed. Although close to 90% of new cases of HIV are located by PCRS counselors,[17] it is likely that the cases not interviewed were not missing at random (e.g., may be more likely to be ill, to have left the state, or to have provided false contacting information). We were unable to assess this bias, but the low prevalence of cases that were not interviewed should have minimal impact on the analysis.

Additionally, approximately 30% of named sexual partners were unable to be located and interviewed by PCRS counselors. This percentage is higher than the prevalence reported in the 2001 review of the NC PCRS program. The difference may be due to our restriction to only females or our chart abstraction protocols. For our data, we included all named contacts, including those who were unlikely to be located

Figure. Outcomes of partner notification services for 18- to 30-year-old female index cases newly diagnosed between 2002 and 2005 in North Carolina, stratified by pregnancy status at time of human immunodeficency virus diagnosis

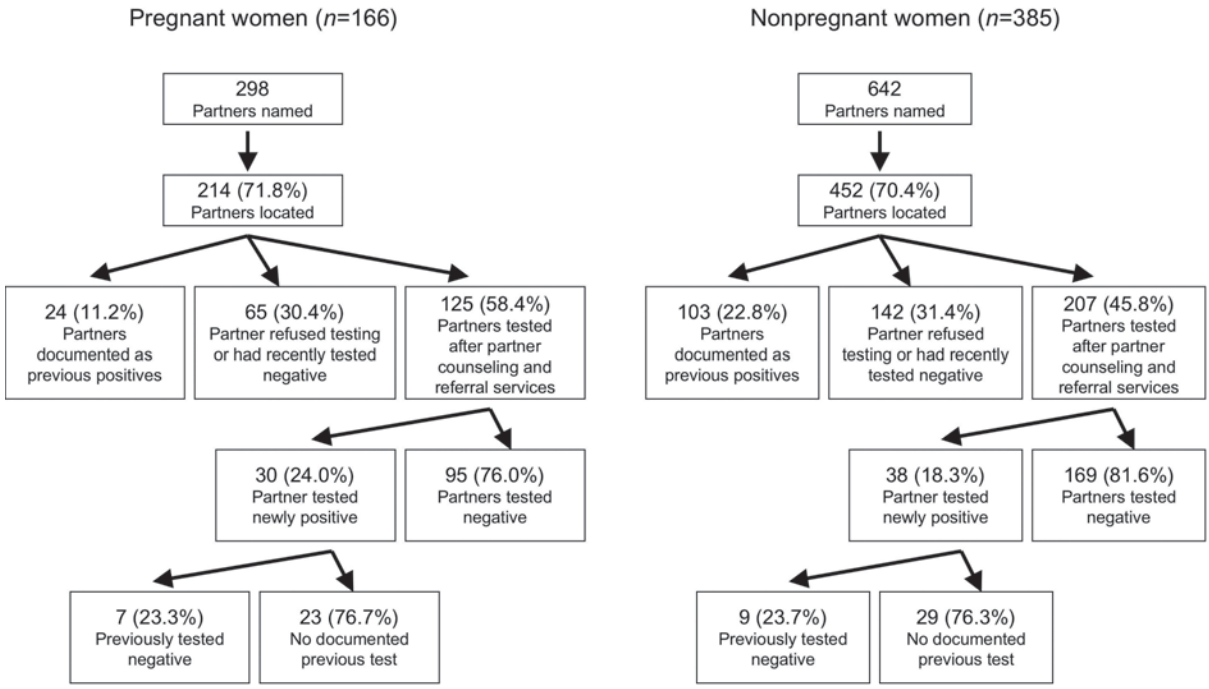

Table 2. Timing of diagnosis between women aged 18 to 30 years with newly diagnosed HIV infection and their positive partner, by pregnancy status at time of diagnosis, North Carolina, 2002–2005

	Percent pregnant (n=54)	*Percent nonpregnant (n=140)*[a]	*P-value*
Partner diagnosed first	44.4	73.0	<0.01
Woman diagnosed first	53.7	22.0	<0.01
Diagnosed same day	1.9	5.0	0.34

[a]Date of diagnosis missing for one partner

(e.g., were residing out of the state or country or for whom no contacting information was provided). Still, 30% missing data could have substantial impact on our conclusions. However, there were no differences in the proportion of contacts interviewed by pregnancy status of the female index case, thereby minimizing bias in the statistical comparisons.

The majority of data abstracted from the PCRS charts were based on self-report, including risk behaviors and named sexual contacts. Pregnant women may differentially report risk behaviors, such as drug use and number of sexual partners, due to social desirability bias. Additionally, we did not have information on the type of sexual partnerships (e.g., husband, casual partner) for the named contacts. Because pregnant women may have a higher prevalence of steady partnerships, this may explain the shorter time lag between subsequent diagnoses of infected undiagnosed partners (e.g., they are easier to locate and/or more willing to accept testing). Additionally, for men who knew they were infected, partner type may have influenced whether they disclosed their status to the female case. Future research could investigate the role of partner type in outcomes of PCRS to better inform prevention efforts.

Finally, PCRS counselors were not able to identify an infected sex partner for more than 60% of the female cases in this sample. This lack of identification may be the result of missing data on partners unable to be located, partners declining testing, or women who may not have provided complete information on their sexual partners during PCRS counseling.

CONCLUSIONS

Our review of testing and PCRS for pregnant women documented the public health impact of the combined programs. Our findings suggest that comprehensive testing during prenatal care may increase early diagnosis of HIV among females and, combined with partner notification, can be effective in reaching infected male partners who are undiagnosed. At the community level, monitoring trends in co-diagnosis of pregnancy and HIV can aid public health practitioners in identifying groups to be targeted for increased screening efforts, as well as subpopulations that may have differential access to and acceptance of routine HIV screening. In this study sample, Hispanic women were disproportionately diagnosed while pregnant; however, other settings may have populations with different demographic or risk profiles.

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