M. ISABEL FERNÁNDEZ, PHD ■ TRACEY E. WILSON, PHD
KATHLEEN A. ETHIER, PHD ■ EMMANUAL B. WALTER, MD
CARYL L. GAY, PHD ■ JAN MOORE, PHD ■ FOR THE PERINATAL GUIDELINES EVALUATION PROJECT

Acceptance of HIV Testing During Prenatal Care

Drs. Fernández and Gay are Assistant Professors, Department of Epidemiology Public Health, University of Miami School of Medicine, Miami, Florida. Dr. Wilson is an Assistant Professor, Department of Preventive Medicine and Community Health, SUNY Downstate Medical Center, Brooklyn, New York. Drs. Ethier and Moore are with the National Center for HIV, STD, and TB Prevention, US Centers for Disease Control and Prevention, Atlanta; Dr. Ethier is a Behavioral Scientist with the Division of HIV/STD Prevention, and Dr. Moore is a Senior Research Pathologist with the Division of HIV/AIDS Prevention–Surveillance and Epidemiology. Dr Walter is an Associate Professor, Department of Pediatrics, Duke University Medical Center, Durham, North Carolina.

SYNOPSIS

Objective. The purpose of this study was to assess the factors associated with acceptance of HIV testing during pregnancy on the part of women receiving prenatal care at public clinics.

Methods. Trained interviewers recruited and interviewed 1,357 women receiving prenatal care at clinics in Florida, Connecticut, and New York City.

Results. Eighty-six percent of participants reported having been tested or having signed a consent form to be tested. Acceptance of testing was found to be related to strong beliefs about the benefits of testing, knowledge about vertical transmission, perceived provider endorsement of testing, and social support. Women who declined testing said they did so because they did not perceive themselves to be at risk for HIV (21%) or they faced administrative difficulties (16%) with some aspect of the testing process (for example, scheduling, limited availability of pre-test counselors).

Conclusions. Acceptance rates can be increased when women understand the modes of vertical transmission and the role of medication regimens in preventing transmission; believe that prenatal identification of HIV can promote the health of mother and child; and perceive their providers as strongly endorsing testing. These points can be woven into a brief pre-test counseling message and made a routine component of prenatal care.

Address correspondence to:
Dr. Fernández, Dept. of Epidemiology and Public Health, Univ. of Miami School of Medicine, BHPP (M-880), PO Box 019132, Miami FL 33101; tel. 305-243-2630; fax 305-243-2634; e-mail <isa@miami.edu>.

Mother-to-child transmission, the primary mode by which children younger than 13 years of age become infected with the human immunodeficiency virus (HIV) in the United States, accounted for 91% of the 8,718 pediatric cases of acquired immune deficiency syndrome (AIDS) reported to the Centers for Disease Control and Prevention (CDC) as of December 31, 1999.[1] In 1994, the results of the AIDS Clinical Trials Group (ACTG) Protocol 076 showed that zidovudine administered to HIV-infected pregnant women and their infants reduced the risk for perinatal transmission by two-thirds.[2] Since publication of these findings, there have been concerted national and local efforts to bring the benefits of HIV testing and appropriate treatment to as many women and children as possible. In 1995, the US Public Health Service (PHS) issued guidelines recommending (*a*) routine HIV counseling and voluntary testing of pregnant women and (*b*) use of zidovudine during the prenatal, perinatal, and postnatal period for HIV-infected women.[3] This approach was endorsed by national organizations including the American College of Obstetricians and Gynecologists and the American Academy of Pediatricians, and the key recommendations were adopted by most states, either by policy or legislation.[4] To help ensure that all pregnant women are tested for HIV, in 1999 the Institute of Medicine proposed the adoption of a national policy of universal HIV testing, with patient notification, as a routine component of prenatal care.[4]

Dramatic reductions in perinatally acquired HIV infection have been attributed to the widespread use of the ACTG 076 treatment regimen.[5–7] Although the extent of these reductions and the speed with which they occurred are impressive, the full promise of the 076 findings has not been fulfilled.[4] In 1999, 232 HIV-infected infants were born in the US.[1] To further reduce perinatal transmission, strategies are needed to ensure that women learn their HIV status during pregnancy and that those who are infected are offered treatment.

Despite the public health benefits of prenatal HIV testing, studies have found rates of HIV test acceptance during pregnancy varying from 36% to 98%.[8–22] No clear picture has emerged of the variables associated with acceptance or refusal of testing during pregnancy. Study results are inconsistent as to whether, age, "race" or ethnicity, income, education, or country of birth are related to test acceptance; some researchers have found relationships,[8–11,21] while others have not.[8,12,13,21] Similarly, perceived risk and HIV risk behaviors have been found to predict acceptance in some studies,[11,14–17] but not in others.[10–12] The relationship between attitudinal variables (such as knowledge, attitudes, and beliefs about testing, and women's perceptions of providers' endorsement of prenatal testing) and test acceptance are at best inconclusive because the attitudinal factors found to significantly predict acceptance vary across published studies.[8–11,15–18,21,22] For instance, in one study knowledge about HIV infection and AIDS was found to be a significant predictor,[22] while in others it was not.[21] Structural, or health system variables (such as availability and ease of testing,[23] composition of the counseling team, perceived value of pre-test counseling to the recipient,[13,23] and presentation of HIV testing as routine practice[17,19,24]) seem to be important predictors of test acceptance, but relatively few studies have examined these variables comprehensively.

Finally, many of the published reports on variables associated with acceptance of prenatal testing are based on data collected during the postpartum period, many months after the decision to accept or reject testing was made.[11–13,22] The psychological literature on retrospective recall bias suggests that the factors that predict testing decisions antenatally may not be accessible to memory after birth.[25] To minimize this bias, it is advisable to collect data on HIV testing during the prenatal period as close as possible to the time at which the decision to accept or decline testing is made.[25]

We addressed these issues in a cross-sectional, multisite study with stringent entry criteria. The purpose of the study was to assess the factors associated with women's decisions to accept HIV testing when offered during pregnancy. Specifically, we looked at how acceptance of testing during the antenatal period was related to participants' self-reported (*a*) demographic characteristics; (*b*) HIV testing history and beliefs about and knowledge regarding HIV testing during pregnancy; (*c*) perceptions of providers' endorsement of prenatal HIV testing and perceptions of providers' competence and manner; (*d*) social support, partner support, and depressive symptoms; and (*e*) HIV-risk behaviors. Given the inconsistency in published findings, we did not generate specific hypotheses for these groups of factors.

METHODS

The Perinatal Guidelines Evaluation Project (PGEP) was a multi-center study supported by the Centers for Disease Control and Prevention with the goal of evaluating PHS guidelines for preventing HIV transmission from mother to child.[3] Because the guidelines included recommenda-

tions regarding HIV testing during pregnancy as well as use of zidovudine to reduce transmission, separate studies were designed to address each component of the guidelines. We report here on a study designed to evaluate HIV testing rates in a sample of pregnant women. A sister study examines testing rates in a postpartum sample.[26]

Participants. From November 1996 through January 1998, we recruited 1,357 women from public prenatal care clinics in Bridgeport, Hartford, New Haven, and Stamford, Connecticut (10 clinics); Miami-Dade, Florida (3 clinics); and Brooklyn, New York (6 clinics). Because the volume and flow of patients varied across the study clinics, we were concerned that randomly approaching women in waiting rooms would introduce selection bias, with women who waited longer having a higher probability of being selected. Therefore we used a systematic sampling procedure; in the larger clinics, study staff approached and screened for eligibility every other woman who arrived at the clinic for care, while in the smaller clinics every woman was approached and screened.

Eligibility criteria. Eligible women were pregnant; were receiving prenatal care at one of the study clinics; and reported having been offered HIV testing within the previous 60 days. Since prenatal care visits are scheduled monthly during the first trimester and then weekly during the second trimester, the 60-day window afforded each potential participant at least two opportunities to be selected for the study. This extended window maximized our pool of potential participants, yet was a short enough interval to minimize recall bias. We excluded from the study women who knew they were HIV-positive at the time of recruitment (<1%) because of the psychological burden associated with a recent HIV diagnosis.

The overall eligibility rate among women approached by study staff was 45%; 81% of those who were ineligible did not meet the entry criteria because they reported having been offered HIV testing more than 60 days before screening. Of the eligible women, 78% agreed to participate.

Interviews. Centrally trained female interviewers conducted brief (five-minute) screenings for eligibility in private areas of the clinics, inviting eligible women to enroll in the study. After a brief description of all study procedures, the interviewers obtained signatures on informed consent forms. The informed consent procedures were approved by the institutional review boards of all participating institutions.

Participants completed semistructured individual interviews that lasted approximately 45 minutes, after which they received small monetary incentives ($10 in Connecticut, $15 in Florida and New York). Most participants completed interviews on the day they were enrolled. Depending on respondents' preferences, screening and interviews were administered in Creole, English, or Spanish.

Acceptance of HIV testing. Participants were asked to report whether they had been tested for HIV and, if not, whether they had signed a consent form to be tested. Then, using an open-ended format, interviewers asked participants to give the main reasons why they had accepted or declined testing. For the present study, we categorized participants as test "acceptors" if they reported that they had been tested for HIV during the previous 60 days or that they had not yet been tested but had signed a consent form to be tested. (To minimize interruption to clinic flow, some women were interviewed after having their blood drawn while others were interviewed before they went to the laboratory.) We classified women who had not been tested or had not signed a consent form as "decliners."

We assessed test decliners' behavioral intention to accept testing by asking them whether they would accept HIV testing if it were offered immediately. However, women who responded that they would accept HIV testing remained categorized as decliners for the data analysis.

Five predictors of HIV testing. We looked at how the following groups of factors were associated with women's decisions to accept or reject testing.

1. *Demographic characteristics.* Women reported their age, racial/ethnic identification, country of birth, monthly household income, education, parity, and marital status. Age and income were continuous variables. Education was a categorical variable with 10 responses (no formal schooling, elementary school, middle school, some high school, high school graduate or GED, some college, associate degree, college graduate, postgraduate studies, technical school).

We hypothesized that there might be differential test acceptance by race/ethnicity. To determine racial/ethnic identification, the interviewers first asked women if they considered themselves to be Latina/Hispanic. Hispanic women were then asked to report the Hispanic subgroup with which they identified (such as Mexican/Mexican American, Puerto Rican, Cuban/Cuban American, and so on). Non-Hispanic women were asked if they identified as white, black, Native American/Alaska Native,

Asian/Pacific Islander, mixed, or other. Women who identified as black were asked to report which of the following groups they identified with: African American, Haitian, Bahamian, Other Caribbean, African, or other.

2. *Testing factors.* We assessed women's HIV testing history, their beliefs about the benefits of testing, and their knowledge about vertical transmission. Women reported the total number of HIV tests they had taken and the number of these tests that had been performed during previous pregnancies. Using an open-ended format, the interviewers asked respondents to give their reasons for accepting or declining testing during pregnancy. Two independent raters categorized these open-ended responses; inter-rater reliability was 95%.

To assess perceived risk for HIV infection, we used one item with four response options ranging from "no chance" to "a very good chance" of getting HIV; a score of 4 was associated with greatest perceived risk.

Women reported their beliefs regarding the benefits of prenatal HIV testing for mother and child using five-point modified Likert-type scales; combined scores for the two scales ranged from 1 to 10 (Cronbach's $\alpha = 0.71$). We measured how well informed women were about vertical transmission by the sum of the correct answers on four yes-no items (knowing that HIV could be transmitted from mother to child during pregnancy, delivery, and breast feeding, and knowing the usefulness of zidovudine in reducing transmission), yielding scores ranging from 0 to 4.

3. *Provider factors.* The women responded to questions about their perceptions of prenatal care providers in three areas: (*a*) strength of their providers' endorsement of testing (one item); (*b*) competence of their providers (six items, $\alpha = 0.79$); and (*c*) how well and respectfully their providers treated them (three items, $\alpha = 0.79$). Each item was rated on a four-point scale.

Items related to provider competence included questions such as: "How often does your prenatal care provider explain the reasons for examination procedures or medical tests?"; "How often does your prenatal care provider relieve your worries about your pregnancy?"; "How often do you have doubts about the ability of your prenatal care provider to take care of you?" Items related to how well and respectfully women felt their providers treated them included: "How often does your provider treat you with respect?" "How often does your provider listen to everything you have to say"; and "How often is your provider kind and considerate of your feelings?"

4. *Psychosocial factors.* We measured depressive symptoms with the Center for Epidemiologic Studies Depression Scale (CES-D), which includes 15 items, each rated on a four-point scale ($\alpha = 0.87$).[27] We used a slightly modified version of the Perceived Availability of Support Scale to assess perceived social support.[28] This scale included nine items, each rated on a five-point scale, yielding a combined score ranging from 9 to 45 ($\alpha = 0.88$). To measure perceived partner support, participants answered two yes-no items about financial and emotional support. To measure perceived abuse, we used two yes-no items about verbal or physical abuse by partners.

5. *HIV-related risk factors.* The women reported whether they had exchanged sex for drugs or money and whether they had had sex with a drug user, a gay or bisexual man, a man who had been in jail, or a person with HIV infection during both the five years before and the year before the current pregnancy. They also reported their number of male sex partners for the same time periods; lifetime history of being diagnosed with a sexually transmitted disease; and frequency of use of marijuana, crack, cocaine, heroin, or methadone during their lifetimes and during the year before the pregnancy.

Data analyses. All analyses were conducted with the Statistical Package for the Social Sciences, Version 8.0.[29]

We first compared demographic characteristics and predictors of test acceptance across sites using chi-square analyses, *t*-tests, and analyses of variance.

To examine the association with test acceptance of the five sets of variables, we used weighted least squares regression. This was reasonable because the statistical properties of unbiasedness, efficiency, and normality hold reasonably well in the data.[30,31] We conducted separate, parallel, forward selection logistic regressions for each of the five predictor areas. Then, we generated a final logistic regression equation to assess an integrated model of the predictors of test acceptance, entering only the predictors that were significant. For the overall model, we also report the deviance, a measure of how well the model fits the data (smaller deviance values indicate a better fit).

RESULTS

A total of 1,361 women participated in the study; exclusion of four participants for whom data were incomplete yielded a sample of 1,357 women (311 in Connecticut; 548 in New York; 498 in Florida) (see Table 1). According to self-report, the median monthly household income was $942 ($1,200 in Connecticut; $700 in New York; $1,000 in Florida). The mean age was 25.7 years (22.4 in Con-

necticut; 26.1 in New York; 27.2 in Florida), with a standard deviation of 6.6.

In univariate analyses significant demographic differences emerged among the three sites. Women from New York were less likely than women from Florida or Connecticut to have graduated from high school. Women from Connecticut were less likely to be married and to have been previously tested than women from Florida or New York. They were also more likely to report a history of sexually transmitted diseases, and they reported more sexual risk factors, more drug use, and greater perceived risk of HIV.

Test acceptance. More than 86% of participants were test acceptors. In answer to an open-ended question, the women offered two main reasons for accepting prenatal HIV testing: (*a*) believing that testing was a positive thing to do for the baby's or the mother's health (66%) and (*b*) perceiving that their provider strongly endorsed testing (19%). Among the 14% of women who had declined prenatal HIV testing, the four most frequent reasons for declining testing were (*a*) no perceived risk (20.7%), (*b*) administrative and scheduling difficulties (15.6%), (*c*) previous testing (11.7%), and (*d*) lack of endorsement of testing by provider (9%). Other reasons included not wanting to know HIV status (5.9%), not being sure if the test had been done (3.2%), wanting to wait until the baby was born (2.7%), and not being able to afford the test (2.1%). Of those who declined, 11% gave no reason. When those who had declined testing were asked whether they would accept HIV testing if offered on the day of the interview; almost 55% said they would.

Eight variables were found to be significant predictors of test acceptance in univariate analyses (Table 2). Test acceptance varied significantly by site ($\chi^2 = 69.64$, $P = 0.0005$). Test acceptance was higher among women from Florida (95.6%) than among women from New York

Table 1. Self-reported demographic characteristics of respondents (*N* = 1,357)

	State			
	Connecticut	Florida	New York	Overall
Variable	Percent	Percent	Percent	Percent
High school graduate[a]	49.5	51.0	45.1	48.3
Employed	33.9	23.9	22.8	25.7
Married	21.9	44.5	31.7	34.2
US-born[a]	80.1	27.5	34.7	42.4
Previously tested[a]	47.3	62.4	50.0	53.9
No history of STD[a]	67.5	82.3	81.5	78.7
No sexual risk factors				
Past 5 years[a]	69.0	84.5	80.9	79.6
Past year[a]	78.4	90.9	88.3	87.1
No drug use				
Lifetime[a]	35.0	60.9	58.4	54.1
Past year[a]	46.5	70.1	67.8	63.8
Number of sex partners in past 5 years[c]				
1	47.6	58.0	53.7	54.1
2	28.0	24.3	28.2	26.6
≥3	24.4	17.7	18.2	19.4
Number of sex partners in past year[b]				
1	82.0	92.3	89.5	89.0
2	12.4	5.3	7.8	7.9
≥3	5.2	2.2	2.6	3.0
No perceived HIV risk[a]	45.0	62.8	61.8	58.4

[a] $P \leq 0.0005$
[b] $P \leq 0.005$
[c] $P \leq 0.05$

Table 2. Significant predictors of test acceptance: univariate analyses

Variable	Acceptors		Decliners	
	Number	Percent	Number	Percent
State[a]				
Connecticut	280	89.9	31	10.1
Florida	476	95.6	22	4.4
New York	426	77.7	122	22.3
Self-reported demographic characteristics				
Racial/ethnic identification[b]				
White	63	84.0	12	16.0
Hispanic	600	89.3	72	10.7
Black	448	82.5	95	17.5
Other	29	80.6	7	19.4
	Mean	Standard deviation	Mean	Standard deviation
Age[c]	25.55	6.60	26.9	6.63
Monthly household income (dollars)	922.86	864.53	859.80	799.54
Testing factors				
Beliefs about benefits of testing (range 1–0)[b]	9.24	1.52	8.78	2.19
Knowledge about vertical transmission (range 1–10)[b]	2.44	0.99	2.24	0.99
Provider factors				
Perceived provider endorsement of testing (range 1–10)[b]	2.54	1.38	2.03	1.43
Psychosocial factors				
Perceived social support (range 9–45)[d]	34.08	6.29	32.80	6.98
HIV-related risk factors	—		—	

[a] $P \leq 0.0005$
[b] $P \leq 0.005$
[c] $P \leq 0.01$
[d] $P \leq 0.05$

(77.7%) or Connecticut (89.9%). Compared with Florida, the relative prevalence of accepting testing for New York was 0.81 (95% confidence interval [CI] 0.78, 0.85), and for Connecticut it was 0.90 (95% CI 0.85, 0.96).

Test acceptance varied significantly by racial/ethnic identification ($\chi^2 = 12.65$, $P = 0.005$). Hispanic women (89.3%) had higher test acceptance rates than black women (82.5%), white women (84.0%), or women in the "other" category (80.6%). In addition to mean differences in income, the mean monthly household income of test acceptors ($922) was higher than that for test decliners ($859). Positive beliefs about the benefits of HIV testing, stronger perceived provider endorsement of prenatal testing, a higher score on knowledge of vertical transmission, and higher social support predicted test acceptance. Sexual or drug risk did not predict acceptance.

The significant predictors of test acceptance across the five logistic regressions are shown in Table 3. Overall, the multivariate and univariate results are congruent. For the final regression equation (see Table 4), we forced entry of site as the first predictor to account for the substantial demographic differences across sites. This allowed us to examine how well the other predictors accounted for variance beyond that accounted for by site. In the final model, all variables identified in area-specific regressions remained significant predictors of test accep-

tance, except partner support. Using these variables, we classified 86.25% of the women correctly on test acceptance ($\chi^2 = 149.85$, $df = 10$, $P < 0.0001$).

DISCUSSION

Widespread use of the ACTG 076 treatment regimen and other antiretroviral therapies during pregnancy have led to dramatic reductions in perinatally acquired HIV infection in the US.[5,7] Women need to learn their HIV status during pregnancy so that those who are infected can be started on appropriate regimens. In the US, HIV testing during pregnancy can only be done with women's consent. It is important to understand what influences women's decisions to accept or reject testing so that interventions to increase acceptance of prenatal testing can be developed. Because we selected only women who had recently been offered HIV testing, our study yielded important information regarding acceptance of testing when offered in the context of prenatal care.

Most women enrolled in our study (86%) accepted HIV testing. This high overall acceptance rate highlights the importance of routinely offering HIV testing to pregnant women, as recently recommended by the Institute of Medicine.[4] Still, 14% of women did not accept the offer. Our findings suggest that rates of acceptance of HIV testing can be increased when women understand the modes of vertical transmission and the role of medication in preventing transmission; believe that prenatal identification of HIV infection can promote the health of the mother and child; and perceive their providers as strongly endorsing prenatal testing. These three points can be woven into a brief pre-test counseling message and made a routine component of prenatal care with little additional burden on providers. This brief message may be longer than some providers currently give, but it is shorter than required by existing US Public Health Service counseling and testing guidelines.[3,32]

In addition to a brief pre-test counseling message, several practical strategies to increase HIV test acceptance by pregnant women are suggested by our findings. Because offering testing is a necessary condition for acceptance of testing, considerable efforts should be dedicated to increasing providers' support of prenatal testing. Such efforts could include (*a*) clear, proactive testing policies at the state, local, and institutional levels; (*b*) strong endorsement of prenatal testing by professional organizations and medical societies; (*c*) systematic provider training at the local level, which could be included in the HIV training required for the licensure and re-licensure of health pro-

Table 3. Significant predictors of test acceptance: multivariate analyses

Predictor	*Odds ratio*	*95% confidence interval*
Logistic regression of self-reported demographic characteristics		
Younger age[c]	0.97	0.95, 0.99
Racial/ethnic identification (Hispanics, referent)		
Hispanics vs whites	0.71	0.33, 1.52
Hispanics vs other	0.58	0.23, 1.48
Hispanics vs blacks[b]	0.59	0.41, 0.85
Logistic regression of testing factors		
Positive beliefs about benefits of prenatal testing[b]	1.31	1.21, 1.43
Greater knowledge about vertical transmission[c]	1.21	1.04, 1.41
Logistic regression of provider factors		
Strong perceived provider endorsement of testing[a]	1.29	1.16, 1.44
Logistic regression of psychosocial factors		
Stronger perceived social support[b]	1.04	1.01, 1.06
Logistic regression of HIV risk factors	—	—

[a] $P \leq 0.0005$
[b] $P \leq 0.01$
[c] $P \leq 0.05$

Table 4. Significant predictors of test acceptance: final model

Predictor	Odds ratio	95% confidence interval	Deviance
State (Florida, referent)			78.91
Florida vs Connecticut[a]	0.17	0.10, 0.31	
Florida vs New York[a]	0.15	0.09, 0.25	
Younger age[b]	0.97	0.9, 0.99	6.63
Racial/ethnic identification (Hispanic, referent)			7.98
Hispanic vs white	0.74	0.35, 1.58	
Hispanic vs other	0.60	0.24, 1.53	
Hispanics vs blacks[b]	0.60	0.41, 0.86	
Stronger perceived social support[b]	1.04	1.01, 1.07	7.65
Greater knowledge about vertical transmission[a]	1.41	1.19, 1.67	15.85
Positive beliefs about benefits of prenatal testing[a]	1.25	1.11, 1.42	15.87
Stronger perceived provider endorsement of testing[a]	1.24	1.10, 1.40	13.35

[a] $P \leq 0.0005$
[b] $P \leq 0.01$

fessionals in many states; (*d*) public information campaigns and educational programs focused on perinatal transmission and the role of treatment in preventing transmission; and (*e*) regular monitoring of test acceptance rates in prenatal care settings.

Simplifying the testing process may also increase rates of test acceptance. Many of the women gave scheduling and other administrative difficulties as reasons for not being tested. The easier the testing process, the fewer delays and scheduling problems, the more likely that women will be tested. Additionally, more than half of the women who had not been tested said they would accept testing if offered on the day of their interview. Consistent with current guidelines, HIV testing should be repeatedly offered to those who initially declined testing.

Our study had several limitations. Participants in this study were women receiving prenatal care and thus did not include the most disenfranchised women, whose first contact with the health care system is at delivery. Our sample did include women who entered care at different points in their gestation period. The majority (55%) had entered care during their second trimester of pregnancy; approximately one third were "late" entrants, having enrolled in care during the third trimester.

Our stringent entry criteria represent both a strength and a limitation of the study. By restricting the sample to women who had recently been offered testing, we strengthened our ability to identify the factors associated with the decision to accept or reject the HIV testing offer, which was one of our study goals. However, because test acceptance was measured in the context of having been offered a test within the past 60 days, our acceptance rates do not reflect overall testing rates at the participating clinics.

Furthermore, these data may have been impacted by the changing legislative environment regarding counseling and testing of pregnant women. For instance, during the course of our data collection, Florida instituted name reporting of HIV-infected individuals and New York legislated mandatory testing of all newborns. Similarly, testing rates can be influenced by facilities' policies and procedures, which varied across the 19 clinics. Since the observed differences in testing rates across the three sites site could not be explained by differences in women's knowledge, beliefs, or attitudes, they may have been influenced by differences in policies and procedures.

Despite these limitations, our findings have implications for national policy on reducing perinatal transmission in the United States. In addition to supporting the Institute of Medicine's recommendation to make testing a routine part of prenatal care,[8] our data suggest an approach to making testing more relevant for pregnant women. A brief, but targeted pre-test message that helps pregnant women to understand the benefits of prenatal testing, including the use of medication to reduce the

chances of perinatal transmission, coupled with strong provider endorsement for prenatal testing, may be a way to achieve high rates of prenatal testing. This intervention would also provide a foundation for a pregnant woman who tests HIV-positive to accept treatment for herself and her baby.

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