The Effectiveness of State and National Policy on the Implementation of Perinatal HIV Prevention Interventions

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Objectives. The 1994 and 1995 US Public Health Service Guidelines regarding HIV testing and treatment for pregnant women and the resulting 1995 California law mandating an HIV test and treatment offer to every pregnant woman aim to reduce perinatal HIV transmission. However, the effectiveness of such policies after implementation is often unclear. We analyzed the association between these policies and offers of HIV tests and treatment to HIV-infected women in California.

Methods. Data from active, population-based surveillance of 496 HIV-infected women and their infants, collected from 1987 to 2002, were analyzed to compare rates of offers of HIV tests and treatment before and after 1996.

Results. We found significant increases in offers of HIV tests ($P<.001$) and offers of treatment ($P<.001$) when we compared women who delivered between 1987 and 1995 with those who delivered between 1996 and 2002. Receipt of prenatal care was the major predictor of both test and treatment offer. A significant shift in reported HIV risk factors was also evident between the 2 groups.

Conclusions. Our findings of increased offers of HIV tests and treatment to HIV-infected pregnant women suggest that the national guidelines and the 1996 California law improved health care for these women, which may lessen the risk of perinatal HIV transmission. (*Am J Public Health.* 2007;97:1041–1046. doi:10.2105/AJPH.2005.072371)

Perinatal HIV transmission accounts for 85% of pediatric HIV cases and more than 90% of pediatric AIDS cases in the United States.[1,2] In 1994, the US Public Health Service (USPHS) issued guidelines stipulating that HIV-infected pregnant women and their newborns be offered a 3-part zidovudine regimen,[3] based on the Pediatric AIDS Clinical Trials Group Protocol 076 (hereafter referred to as "076 Protocol") finding that this regimen reduces perinatal transmission by 67%.[4] Because a barrier to HIV treatment may be unknown HIV status, the USPHS recommended, in 1995, all pregnant women be offered voluntary HIV testing. Since these recommendations were implemented, US perinatal HIV has decreased significantly.[5,6] Nonetheless, 390 new perinatal infections were reported from 36 states in 2001.[1]

In California, Senate Bill 889 became effective January 1, 1996. The bill mandates that prenatal care providers offer, and document the offer of, an HIV test to every pregnant woman.[7] The law also requires that HIV-infected women be offered treatment for themselves and their newborns. However, 2 California studies performed in or after 1996 found that only 47.3% to 56.2% of populations of pregnant or recently delivered women reported HIV counseling, and 74.3% to 79.9% reported a test offer.[8,9] Furthermore, the 1998 California Survey of Childbearing Women, in which newborn heel-stick blood specimens were tested for HIV antibodies and zidovudine, found that 23.4% of infants with HIV-infected mothers did not have evidence of zidovudine. This suggests that HIV-infected mothers may not have had zidovudine during pregnancy or at labor.[10]

These results raise questions about the impact of policies like the 1996 California law and illustrate the importance of evaluating the effectiveness of such policy. In addition, to increase interventions aimed at HIV-infected women and their prenatal care providers, it is crucial to determine whether subpopulations of HIV-infected women are not being tested and treated.

In California, active population-based surveillance data on HIV-infected mothers and their infants has been collected since 1989.[11,12] We used these data both to evaluate the association of the 1994 and 1995 USPHS guidelines and the 1995 California law with HIV testing and treatment in California and to define characteristics of HIV-infected pregnant women who do not receive appropriate care as defined by the policies. Specifically, we assessed which HIV-infected mothers are not offered HIV testing in prenatal care despite having unknown HIV status or are not offered preventative therapy despite being known to be HIV infected.

METHODS

The data for this study came from the Maternal–Infant Care Evaluation, Pediatric Spectrum of Disease,[11] and Enhanced Perinatal Surveillance[13] studies, all based at Stanford University, Stanford, Calif. In 1989, the Centers for Disease Control and Prevention, in collaboration with the California Department of Health Services and Stanford University, initiated the Pediatric Spectrum of Disease study, consisting of the surveillance of infants born to HIV-infected women living in California. In 1996, the Maternal–Infant Care Evaluation study began retrospectively collecting data on testing, care, and treatment of HIV-infected pregnant women. In 1999, the Maternal–Infant Care Evaluation study expanded to become the Enhanced Perinatal Surveillance study, which collected maternal and infant data on demographics, prenatal care, HIV testing, antiretrovirals in pregnancy, and other variables.

For all 3 studies, HIV-infected mothers and exposed children were identified for follow-up by obstetricians or pediatricians at collaborating facilities. Data were collected through medical chart reviews, with patient records classified only by alphanumeric codes (the Soundex phonetic algorithm) and birthdates to ensure confidentiality. Collaborating counties included San Mateo, Santa Clara, Alameda, Contra Costa, San Francisco, San Diego, Sacramento, and Fresno. Because the

hospitals in these counties are regional referral centers for HIV-infected women and infants, a larger geographic region is represented. This representation was demonstrated in a study showing that capture rates in the Pediatric Spectrum of Disease study were similar to those in the statewide, population-based Survey of Childbearing Women.[14,15]

For this study, Maternal–Infant Care Evaluation and Enhanced Perinatal Surveillance study data were merged. For 113 maternal records missing infant treatment data, maternal records in the merged database were matched with infant records in the Pediatric Spectrum of Disease study. Twins births were counted as 1 pregnancy, with the data collected on the second-born twin excluded from the analysis. HIV-infected mothers with multiple children were included for each pregnancy. Four records with years of delivery 1985 through 1986 were excluded because the Food and Drug Administration did not approve zidovudine until 1987.[16] In total, 496 records were analyzed. Data were divided into 2 cohorts: delivery years 1987 through 1995 and 1996 through 2002. This allowed analysis of combined effects of the 1994 and 1995 USPHS guidelines and 1996 California law.

Summary statistics are presented for the whole population. Subsequent analyses examined offers of HIV tests and acceptance excluding women diagnosed before pregnancy, offers of treatment excluding those diagnosed after the prenatal period, and opportunities to complete treatment excluding women who gave birth between 1987 and 1995 and those diagnosed after the prenatal period. Because it is important that women in prenatal care with unknown HIV status be offered an HIV test and those with HIV be offered treatment, separate analyses were conducted among women who received prenatal care. For all outcomes, if the test or zidovudine offer was not documented in the chart, it was assumed that it was not offered. The 076 Protocol consists of giving zidovudine to women during pregnancy and then at labor or delivery, and to the infant at birth. All 3 parts of the 076 Protocol had to be documented to be considered complete.

Maternal variables included year of delivery, timing of HIV diagnosis, age, race, prenatal care, drug use, homelessness, mental illness, and sexual history. "Prenatal care" reflected whether women received 2 or more prenatal care visits. "Drug use" reflected whether women ever used intravenous or nonintravenous illicit drugs. "Homelessness" reflected whether women reported ever being homeless. "Mental illness" reflected whether women reported current or previous mental illness. "Sexual history" included information on if the woman had ever had "high-risk sex," defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection. All the behaviors were self-reported except for those that could be clinically verified, for example, by a toxicology screen or sexually transmitted disease test.

Analyses were performed with SAS version 8.2 (SAS Institute Inc, Cary, NC). To test bivariate associations, the 2-sided Fisher exact statistics was used. For multivariate analysis, logistic regression models were used. Correlations between independent variables were explored using the Pearson correlation coefficient. Significance was established at $P \leq .05$. For multivariate analysis, odds ratios (ORs) and 95% confidence intervals (CIs) were generated. Missing data reduced the available sample for some analyses; potential differences between pregnancies that were included versus those that were excluded for each analysis because of missing data were assessed.

RESULTS

Study Population

Table 1 provides the sample maternal characteristics for the 496 deliveries. Black women constituted the largest group (48%), followed by White women and Latinas. Most women (77%) were aged 20 to 35 years. In this population, 53% of women were diagnosed with HIV before pregnancy with the remainder diagnosed during pregnancy, at labor, or after pregnancy. The majority (61%) of deliveries took place during 1996 through 2002, largely because of increased capture rates secondary to expansion of surveillance. Receipt of prenatal care was documented in 421 (85%) women's charts. About half (54.6%) of the women had a history of drug use, 6.3% reported a history of homelessness, 10.1% reported a history of mental illness, and 41.5% had a history of engaging in high-risk sex.

Offer of HIV Test

Among the 231 HIV-infected women not diagnosed before pregnancy, 160 (69.3%) had a documented offer of an HIV test. Between 1987 through 1995 and 1996 through 2002, there was a significant ($P<.001$) increase in women with unknown HIV status being offered a test. Maternal factors associated with an offer of an HIV test in bivariate analyses included receiving prenatal care, having never used drugs, and having had high-risk sex (Table 2).

Separate analyses were performed on the group of HIV-infected women who received prenatal care (n=178; 77.1%). Of those, 150 (84.3%) had an offer of an HIV test documented in their charts. Again, there was a significant association between year of delivery and test offer, with women delivering between 1996 and 2002 more likely to have been offered an HIV test than those delivering between 1987 and 1995 ($P=.002$). Among women in prenatal care who gave birth between 1996 and 2002, there were no variables significantly associated with receiving a test offer.

In multivariate analysis, all significant variables from the bivariate analysis were included in a logistic regression model. Only having received prenatal care (OR=27.4; 95% CI=10.7, 79.2) and giving birth between 1996 and 2002 (OR=3.8; 95% CI=1.7, 9.0) remained significantly associated with receiving a test offer. Several predictor variables that were significant in bivariate but not multivariate analysis were significantly correlated with year of delivery. In particular, those giving birth between 1996 and 2002 were less likely to have used drugs (r=–0.27; $P<.001$), less likely to have been homeless (r=–0.12; $P=.008$), and less likely to have a history of mental illness (r=–0.13; $P=.003$), but more likely to have engaged in high-risk sex (r=0.41; $P<.001$). In addition, being Black was significantly correlated with drug use (r=0.16; $P=.01$), but race remained not significant when drug use was removed from the model. There were no significant interaction terms.

Acceptance of HIV Test

Among the 160 women with unknown HIV status who were offered an HIV test, 155 (96.9%) accepted. The only significant variation in acceptance was that women older

TABLE 1—Characteristics of HIV-Infected Women Giving Birth (n = 496): Maternal–Infant Care Evaluation, Pediatric Spectrum of Disease, and Enhanced Perinatal Surveillance Studies; California, 1987–2000

Characteristic	All Study Women, No. (%)	Women Giving Birth 1987–1995, No. (%)	Women Giving Birth 1996–2002, No. (%)	*P*
Year of delivery				
1987–1995	192 (38.7)	NA	NA	
1996–2002	304 (61.3)	NA	NA	
Maternal age, y				.96
< 20	19 (3.8)	6 (13.1)	13 (4.3)	
20–24	104 (21)	38 (19.8)	66 (21.7)	
25–29	145 (29.2)	58 (30.2)	87 (28.6)	
30–34	133 (26.8)	51 (26.6)	82 (26.9)	
≥ 35	92 (18.6)	38 (19.8)	54 (17.8)	
Unknown	3 (0.6)	1 (0.5)	2 (0.7)	
Race/ethnicity				.25
Black	236 (47.6)	101 (52.6)	135 (44.4)	
White	123 (24.8)	48 (25.0)	75 (24.7)	
Hispanic	98 (19.8)	32 (16.7)	66 (21.7)	
Other	34 (6.9)	9 (4.7)	25 (8.2)	
Unknown	5 (1)	2 (1.0)	3 (1.0)	
Time of HIV diagnosis				< .001
Before this pregnancy	265 (53.4)	81 (42.2)	184 (60.5)	
During this pregnancy	147 (29.6)	51 (26.6)	96 (31.6)	
At labor	24 (4.8)	17 (8.8)	7 (2.3)	
After this pregnancy	32 (6.5)	22 (11.5)	10 (3.3)	
Unknown	28 (5.6)	21 (10.9)	7 (2.3)	
Received prenatal care				< .001
No	68 (13.7)	46 (23.9)	22 (7.2)	
Yes	421 (84.9)	141 (73.4)	280 (92.1)	
Unknown	7 (1.4)	5 (2.6)	2 (0.7)	
History of drug use				< .001
No	225 (45.4)	53 (27.6)	172 (56.6)	
Yes	271 (54.6)	139 (72.4)	132 (43.4)	
History of high-risk sex[a]				< .001
No	290 (58.5)	165 (85.9)	125 (41.1)	
Yes	206 (41.5)	27 (14.1)	179 (58.9)	
History of homelessness				.008
No	465 (93.8)	173 (90.1)	292 (96.1)	
Yes	31 (6.3)	19 (9.9)	12 (3.9)	
History of mental illness				.003
No	446 (89.9)	163 (84.9)	283 (93.1)	
Yes	50 (10.1)	29 (15.1)	21 (6.9)	

Note. NA = not applicable.
[a]High-risk sex was defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection.

TABLE 2—Offer of HIV Test Among HIV-Infected Pregnant Women: Maternal–Infant Care Evaluation, Pediatric Spectrum of Disease, and Enhanced Perinatal Surveillance Studies; California, 1987–2002

Characteristic	Offered HIV Test, No. (%)	*P*
Delivery year		< .001
1987–1995	59/111 (53.2)	
1996–2002	101/120 (84.2)	
Race/ethnicity		.083
Black	66/105 (62.9)	
All others	90/121 (74.4)	
Received prenatal care		< .001
No	8/48 (16.7)	
Yes	150/178 (84.3)	
History of drug use		.002
No	74/123 (60.2)	
Yes	86/108 (79.6)	
History of high-risk sex[a]		.008
No	90/143 (62.9)	
Yes	70/88 (79.6)	
History of homelessness		.4
No	151/216 (69.9)	
Yes	9/15 (60.0)	
History of mental illness		.33
No	147/209 (70.3)	
Yes	13/22 (59.1)	

[a]High-risk sex was defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection.

than 30 years of age were less likely to accept (*P*=.012). The 5 women who refused testing had the following characteristics: 2 were Hispanic, 1 was Black, 1 was of unknown race/ethnicity, and 1 was of other race/ethnicity; 2 gave birth before 1996; 3 received prenatal care; and all were older than 30 years of age.

Treatment Offer

Women not diagnosed with HIV until labor (n=24; 4.8%) or after this pregnancy (n=32; 6.5%) were excluded from the analysis. We analyzed zidovudine receipt among women on highly active antiretroviral therapy to ensure that women in this group were not counted as individuals not offered treatment. We found that every woman known to be on highly active antiretroviral therapy was also offered zidovudine. Therefore, these women were included in the larger analysis.

Of the 440 pregnant women available for analysis, 328 (74.6%) were offered zidovudine during pregnancy or at labor. Among the 287 births between 1996 and 2002, 86.8% were offered zidovudine, and among those in prenatal care and giving birth between 1996 and 2002 (n=274), 87.6% were offered zidovudine. Zidovudine was significantly more likely to be offered to women giving birth between 1996 and 2002 (*P*<.001) compared with those giving birth between 1987 and 1995 (Table 3). Other factors significantly associated with offer of zidovudine treatment

TABLE 3—Offer of HIV Treatment Among HIV-Infected Pregnant Women: Maternal–Infant Care Evaluation, Pediatric Spectrum of Disease, and Enhanced Perinatal Surveillance Studies; California, 1987–2002

Characteristic	Offered Treatment, No. (%)	*P*
Delivery year		<.001
1987–1995	79/153 (51.6)	
1996–2002	249/287 (86.8)	
Race/ethnicity		.037
Black	143/205 (47.1)	
All others	181/230 (78.7)	
Received prenatal care		<.001
No	8/35 (22.9)	
Yes	319/400 (79.8)	
History of drug use		<.001
No	175/207 (84.5)	
Yes	153/233 (65.7)	
History of high-risk sex[a]		.008
No	174/250 (69.6)	
Yes	154/190 (81.1)	
History of homelessness		.035
No	314/415 (75.7)	
Yes	14/25 (56.0)	
History of mental illness		.031
No	300/394 (76.1)	
Yes	28/46 (60.9)	

[a]High-risk sex was defined as sexual contact with someone known to be HIV infected or at high risk of HIV infection.

included being of any race/ethnicity other than Black, having had prenatal care, having not used drugs, having not been homeless, having no mental illness, and having a history of high-risk sex (Table 3).

A separate bivariate analysis was performed on women who received prenatal care (n=400). In this group, 319 (79.8%) were offered treatment. Women were more likely to be offered treatment if they delivered between 1996 and 2002 ($P<.001$), were not Black ($P=.034$), and were not drug users ($P=.003$). Among those in prenatal care and giving birth between 1996 and 2002, no variables were significantly associated with treatment offer.

Two multivariate models were created: the first modeled test offer to all women; the second focused on only women in prenatal care. The outcome for both was receipt of an HIV test offer. Both models included all significant variables from the bivariate analyses. In the all-women model, receiving prenatal care (OR=8.3; 95% CI=3.5, 21.4; $P<.001$) and giving birth between 1996 and 2002 (OR=5.9; 95% CI=3.1, 10.7; $P<.001$) remained significant. Interaction terms were not significant. As in the HIV test offer analysis, several predictor variables that were significant in bivariate but not multivariate analysis were again significantly correlated with year of delivery. Specifically, giving birth between 1996 and 2002 was significantly correlated with not using drugs ($r=-0.27$; $P<.001$), not having been homeless ($r=-0.11$; $P=.02$), not having mental health issues ($r=-0.14$; $P=.003$), but having a history of high-risk sex ($r=0.43$; $P<.001$).

In the multivariate model that included only women in prenatal care, only giving birth between 1996 and 2002 (OR=3.7; 95% CI=2.2, 6.2; $P<.001$) remained significant. The correlation between drug use and year of delivery remained present in this model.

Opportunity to Complete 076 Protocol

Because the 076 Protocol study results were not broadly disseminated until after 1994, only HIV-infected women delivering from 1996 to 2002 were examined in this analysis. Additional inclusion criteria were that a woman must have been diagnosed before or during pregnancy and have been offered treatment during pregnancy. Among the 244 eligible women, 10 (4.1%) were excluded because of missing data for 1 or more of the 076 Protocol components. However, there were no significant differences between women who were included versus those who were excluded.

Of the 234 remaining mother–infant pairs, 219 (93.6%) were offered all 3 components (zidovudine for the mother during pregnancy and then at labor and to the infant at birth) of the 076 Protocol. Among the 232 mother–infant pairs in which the woman received prenatal care, 218 (94.0%) were offered all 3 components of the 076 Protocol. There were no significant predictors for whether a mother–infant pair was offered the 076 Protocol. Among those not offered the full course of therapy, all mother–infant pairs were missing the dose given to the mother during labor.

DISCUSSION

Temporal Changes

In this study, the likelihood of clinicians offering appropriate HIV testing and treatment to HIV-infected pregnant women, and in particular, HIV-infected pregnant women in prenatal care, was significantly higher between 1996 and 2002 than it was between 1987 and 1995. This finding suggests that the 1994 and 1995 USPHS guidelines and resulting California law had the desired effect of improving health care for HIV-infected pregnant women. This improvement in turn may decrease perinatal HIV infection. It is, however, not possible to distinguish between the individual contributions of the guidelines versus the law. Data from the California Department of Health Services suggest that the goal of decreasing perinatal HIV infection might also have been met, because perinatal AIDS decreased from an average of 46 cases a year from 1987 through 1995 to about 21 cases a year from 1996 through 2002.[17,18]

Nonetheless, some HIV-infected pregnant women are being missed, likely leading to preventable HIV infections in infants. In particular, receiving prenatal care and giving birth in the later cohort were consistently associated with receiving an offer for an HIV test and treatment. Among women in prenatal care, only year of delivery was associated with test and treatment offer. Among women diagnosed before or during pregnancy who were offered treatment during pregnancy, most mother–infant pairs (93.6%) had an opportunity to complete the 076 Protocol.

The USPHS guidelines' effectiveness in improving the rate of offers for HIV tests and treatment has been demonstrated in other studies. A 4-state study (not including California) found that HIV-infected women identified before delivery increased from 68% in 1993 to 81% in 1996, and the proportion offered various portions of the 076 Protocol increased from between 5% and 27% to between 75% and 85% during the same period.[6] A 7-state study (not including California) found that the proportion of pregnant HIV-infected women diagnosed before delivery increased from

70% to 80% between 1993 and 1996.[6,19] Over the same period, those offered prenatal zidovudine increased from 27% to 83% and those offered intrapartum zidovudine from 6% to 75%. A Michigan study found that prenatal or intrapartum zidovudine use increased from 27% in 1993 to 85% in 2000.[20] A North Carolina study found that from 1995 to 1997, offers of HIV tests increased from 87% to 96%, and offers of any zidovudine increased from 21% in 1993 to 95% in 1997.[21] North Carolina changed its public health regulations in 1995 to require that prenatal care providers offer HIV counseling and a voluntary HIV test to every pregnant client. This suggests that policies similar to the California law have been effective in increasing prenatal HIV testing across states that differ in size and demographics. As previously mentioned, the California Survey of Childbearing Women found that, in 1998, 76.6% of infants of HIV-infected women had evidence of maternal receipt of zidovudine in their blood.[10] Finally, 2 recent Centers for Disease Control and Prevention surveys showed that, nationwide, approximately 48.4% to 54.0% of pregnant women reported having had an HIV test in the preceding 12 months.[22]

The aforementioned findings are similar to our study with a few notable exceptions. First, these studies were largely based on the entire population of pregnant women in a region, whereas our study focused specifically on HIV-infected women to understand the effects of these policies in the target population. Second, our study covers a broader time period than the other studies, allowing for a more complete analysis of the change over time. It also should be noted that the California Survey of Childbearing Women treatment proportion was lower than the treatment-offer proportion for 1996 though 2002 found in our study, probably primarily because of an increase in offers of treatment each year but also possibly because of the discrepancy between offer of treatment and compliance. Third, all of the smaller studies previously mentioned and our study found higher rates of HIV testing than did the national study.[22] This may be because most of the smaller studies relied on chart review and laboratory data whereas the national study relied on surveys of women, introducing recall bias, or because the states studied individually have systematically higher rates of testing than did the nation as a whole.

Test and Treatment Offer Predictors

In our analysis, year of delivery and prenatal care were the only factors that were independently associated with test and treatment offer. Women giving birth between 1987 and 1995 were also significantly more likely to have used drugs, to have been homeless, or to have had a mental illness, as well as to have been less likely to engage in high-risk sex. This finding is supported by other data that suggest that the HIV epidemic in US women is increasingly associated with heterosexual sex and decreasingly associated with other risk factors.[23–26] Thus, it should be impressed upon health care providers that the lack of obvious risk factors should not be used as a guide to offering women prenatal HIV counseling and testing.

Our finding that prenatal care was the most significant predictor of test and treatment offer was consistent with other studies.[6,27,28] Prenatal care is the primary opportunity for clinicians to offer HIV testing and treatment. To maximally decrease perinatal HIV transmission, it is essential to bring women into prenatal care, ideally early enough that those who are HIV-infected can be treated during pregnancy. Myriad barriers to prenatal care access have been previously described, including cultural and language misunderstandings, lack of insurance, and lack of transportation.[29–31] Thus, these barriers must be addressed to ensure that the potential benefits from policy change can be realized.

It is also important to note that year of delivery remains significant among women in prenatal care. This finding suggests that the policy, which was aimed at prenatal care providers, may have had an effect on this group's behavior. Furthermore, although no variables were significantly associated with having received prenatal care, it is encouraging that the Food and Drug Administration recently approved rapid HIV testing. Rapid tests should simplify the testing of women without prenatal care because they can be tested, and treatment can be initiated, at labor and delivery. Nonetheless, the timely receipt of prenatal care and testing is preferable.

Limitations

This study has several limitations. First, the data were collected through medical chart reviews; thus, the quality of the data is dependent upon provider's documentation practices. In particular, since the 1996 California law mandated not only a test offer, but also the documentation of that offer, the increases found here may be because of increased documentation. Second, most of the risk behaviors are self-reported, so all the issues around self-report of sensitive behaviors are present. Third, testing and treatment offer, not uptake, are the main variables of analysis, and test offer, rather than infant infections, is the major outcome. The ultimate goal of the law and guidelines discussed in this article is to prevent perinatal HIV transmission. However, we did not have the data to show if this goal was met, but rather focused on the intermediate outcome—offer of HIV testing and treatment. Furthermore, we do not have data about treatment uptake and adherence, so although the guidelines and law seemed to have had the desired effect of increasing treatment offers to women known to be HIV-infected, we cannot make conclusions about whether women offered treatment in prenatal care received the recommended regimen.

Conclusions

Despite these limitations, the evaluation of previous policies is timely because a second California law, Assembly Bill 1676, passed in September 2003. This law specifies that women in prenatal care be notified that HIV testing is routine but that they can refuse. Furthermore, a test must be offered at labor and delivery if no previous result is available.[32] To justify advocacy around such new laws, the effects of existing policies must be evaluated to ensure they are working.

In conclusion, rates of offers of HIV testing and treatment among pregnant California women significantly improved after the release of federal guidelines and a state law regarding HIV testing and treatment in pregnancy. Despite this improvement, offers of test and treatment are not universal. Receipt of prenatal care was the most important predictor of test and treatment offer, suggesting that removing barriers to prenatal care may be important to maximally reduce perinatal HIV transmission.

Nonetheless, this study suggests that continuing to allocate resources to affect HIV testing and treatment policy is an effective way to both prevent new perinatal HIV infections in infants and to identify, and to ideally initiate care for, HIV-infected women. ■

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This article was accepted May 21, 2006.

Contributions

C.C. Sarnquist and S.D. Cunningham were responsible for the analysis and writing. B. Sullivan implemented the project, which included performing all data collection, managing study sites, and assisting with data interpretation. Y. Maldonado originated the study and supervised all aspects of implementation and data analysis. All of the authors helped to conceptualize ideas, interpret findings, and review drafts of the article.

Human Participant Protection

Institutional review board approval for the study was granted at each site and at Stanford University; approval for data analysis was also granted by the University of California at Berkeley. Informed consent was waived by all institutional review boards as no personal identifiers were recorded.

Acknowledgments

This work was supported by Centers for Disease Control and Prevention and the California Department of Health Services, Office of AIDS (grant 04-35732).

We would like to thank Jaspreet Loyal and David Hill for their help with data management. We would also like to thank all the collaborating facilities in the 9 participating counties for their assistance.

A preliminary portion of this work was presented at the July 2004 XV International AIDS Conference in Bangkok, Thailand.

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