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Prenatal HIV Testing in Wisconsin: Results of a Survey Among Women Who Gave Birth in 2003

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ABSTRACT

Since 1995 the United States Public Health Service has recommended voluntary prenatal human immunodeficiency virus (HIV) testing for all pregnant women in the United States. To better understand how well this goal is being met in Wisconsin, the Wisconsin Division of Public Health facilitated a review of hospital medical records for a random sample of women who gave birth in Wisconsin in 2003. Of the 968 maternal medical records reviewed, 68% (95% CI: 65%-71%) showed evidence that the mother had a completed HIV antibody test during pregnancy. Rates of prenatal HIV testing were higher in Milwaukee County. After controlling for residence, prenatal HIV testing rates were higher among Hispanic mothers compared to white mothers; African American and white mothers had similar testing rates. These data suggest that the goal of voluntary HIV testing for all pregnant women is not currently being met in Wisconsin.

INTRODUCTION

Early in the epidemic of human immunodeficiency virus (HIV) infection, it was recognized that HIV infection could be perinatally transmitted.[1] In untreated populations approximately 16%-25% of children born to HIV-infected mothers acquire HIV infection during gestation, during delivery, or through breast feeding.[2-4] Between 1985 and 1995 approximately 1000-2000 infants per year were born with HIV infection in the United States. The highest number of cases occurred in northeastern states; 85% of these infants were African American or Hispanic.

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In 1994, the results of the Pediatric AIDS Clinical Trial Group (PACTG) 076 showed that treating HIV infected pregnant women and their infants with zidovudine (ZDV) could lower the risk of perinatal HIV infection transmission by approximately two-thirds.[5] Subsequent research has indicated that the risk of transmission can be decreased even further if the viral load of pregnant women with HIV infection can be reduced to very low or undetectable levels.[6-8]

In 1994, in response to these advances, the US Public Health Service (USPHS) recommended that all pregnant women with HIV infection in the United States be offered antiretroviral prophylactic treatment.[9] The potential benefit of this treatment, however, depends on a timely diagnosis of HIV infection among pregnant women. Recognizing this, the USPHS has issued guidelines that recommend universal voluntary HIV testing of all pregnant women in the United States.[10,11]

While the availability of antiretroviral prophylaxis has greatly reduced perinatal HIV transmission in the United States, transmission continues to occur. The Centers for Disease Control and Prevention (CDC) estimated that in the year 2000, between 280 and 370 infants were born with HIV infection in the United States. In Wisconsin, perinatal HIV infection has declined but still persists. Between 1990 and 1993, 26 children were reported as being born with perinatally transmitted HIV infection, compared to 11 children born between 2000 and 2003.[12]

Analysis of national data by CDC shows that lack of prenatal HIV testing contributes significantly to the continued transmission of perinatal HIV infection in the United States.[11] Thus, further reductions in the incidence of perinatal HIV transmission will require improved compliance with the current recommendations for universal HIV testing of pregnant women.

This report presents the results of a review of the

hospital medical records of women who gave birth in 2003 in Wisconsin. We performed this review to estimate the percentage of Wisconsin women who were tested for HIV during pregnancy. These estimates are an important part of assuring that all pregnant women in Wisconsin know their HIV serostatus and thus can make informed choices about treatment options that can protect their own health and the health of their infants.

METHODS

At the request of the survey coordinator, the Bureau of Health Information, Wisconsin Department of Health and Family Services selected a random sample of 1000 births from 2003 Wisconsin birth certificates and prepared a sample file. The sample file included the names and dates of birth of the mother and infant, the name and type of the birth attendant, the birth hospital, maternal demographic characteristics, and prenatal care utilization information.

The survey coordinator incorporated the sample file into the survey database and mailed a data collection form for each birth to the infection control practitioner at the birth hospital. The infection control practitioner was asked to review the maternal hospital medical record, complete the form and return it to the survey coordinator. The data collection form asked for information regarding the presence or absence of evidence of prenatal HIV antibody testing in the hospital's maternal medical record. Hospital staff were specifically instructed not to provide the results of any HIV test.

The survey coordinator entered the information from the data collection forms into the survey database. Approximately 60 days after the first forms were mailed, the survey coordinator recontacted hospitals that had not yet responded to the request. Approximately 30 days later, data collection was terminated and the data was analyzed. Tests of statistical significance were done using Epi Info 6.0 software (CDC).

The Wisconsin Division of Public Heath (DPH) conducted this survey. As the state public health agency, the DPH is authorized under Wisconsin Statute ch.146.82(5), and the Health Insurance Portability and Accountability Act (HIPAA) privacy rule (45 CFR 164.512(b)(1)(i) to receive protected health information for the purpose of public health investigations without prior patient authorization.

RESULTS

We sent requests for medical record reviews to 95 Wisconsin hospitals. The median number of births sampled per hospital was 6 (range: 1-56). Ninety (95%) hospitals responded. Maternal medical records were reviewed and prenatal HIV testing data was obtained for 968 (97%) of the 1000 randomly sampled births. Overall, 68% (95% CI: 65%-71%) of the medical records reviewed indicated that the mother had a completed HIV antibody test during pregnancy (Table 1).

Prenatal HIV testing rates varied by maternal residence, with the highest rate observed in Milwaukee County. The overall prenatal HIV testing rate for Milwaukee County was 85%. Within Milwaukee County, the prenatal HIV testing rate was 88% among residents of the City of Milwaukee and 79% among residents of other cities (Table 1). Among women who resided in counties other than Milwaukee County, the overall prenatal HIV testing rate was 63%. The prenatal HIV testing rates were similar (60%-65%) among residents of Dane County, other Wisconsin metropolitan counties, and non-metropolitan Wisconsin counties. The differences between prenatal HIV testing rates for residents of Milwaukee County and residents of other counties was statistically significant after controlling for racial/ethnicity ($P<0.01$).

Overall, 82% of black non-Hispanic women received prenatal HIV testing compared to 64% of white non-Hispanic women (Table 2). However, after controlling for residence within and outside of Milwaukee County, prenatal HIV testing rates for white non-Hispanic and black non-Hispanic women were not statistically significant different ($P=0.41$). Overall, 88% of Hispanic women received prenatal HIV testing. The difference in prenatal HIV testing rates between white non-Hispanic and Hispanic women was statistically significant after controlling for residence within and outside of Milwaukee County ($P<0.01$).

The number of non-Hispanic American Indian and non-Hispanic Asian/Pacific Islander mothers in this random sample was insufficient to allow for detection of differences. Prenatal HIV testing rates did not statistically differ by maternal age, education, the trimester that prenatal care was initiated, or birth attendant type (Table 1).

DISCUSSION

We found no evidence of prenatal HIV testing in the in-patient medical chart for nearly one-third (32%) of the mothers who were randomized into this evaluation. While nearly all prenatal HIV antibody testing occurs before the pregnant woman is admitted to the hospital

Table 1. Rate of Prenatal HIV Testing Among a Sample of Women Giving Birth in 2003, Wisconsin

	Sample*		Charts Reviewed†		Prenatal HIV Test‡		
	N	%	N	%	N	%	95% CI
Total	1000	100	968	97	654	68	65%-71%
Race/Ethnicity							
White non-Hispanic	791	79	770	97	490	64	60%-67%
Black non-Hispanic	90	9	82	91	67	82	73%-90%
Hispanic	87	9	84	97	74	88	81%-95%
American Indian non-Hispanic	10	1	10	100	8	80	55%-100%
Asian/Pacific Islander non-Hispanic	22	2	22	100	15	68	48%-88%
Maternal Residence							
Milwaukee County	205	21	194	95	165	85	80%-90%
City of Milwaukee	147	15	137	93	120	88	82%-93%
Other Milwaukee County cities	58	6	57	98	45	79	68%-90%
Other Wisconsin counties	795	80	774	97	489	63	60%-67%
Dane County	89	9	89	100	53	60	49%-70%
Milwaukee MSA§	99	10	99	100	64	65	55%-74%
Other metropolitan counties¶	296	30	290	98	187	64	59%-70%
Non-metropolitan counties**	311	31	296	95	185	63	57%-68%
Maternal Age							
<20	93	9	90	97	76	84	77%-92%
20-29	513	51	495	96	328	66	62%-71%
30-39	370	37	361	98	236	65	60%-70%
≥40	24	2	22	92	14	64	43%-84%
Maternal Education							
Less than high school graduate	152	15	148	97	120	81	75%-88%
High school graduate	300	30	288	96	197	68	63%-74%
Some college	229	23	223	97	145	65	59%-71%
College graduate	318	32	308	97	191	62	57%-68%
Prenatal Care Initiation							
1st trimester	864	86	835	97	555	66	63%-70%
2nd trimester	105	11	102	97	79	77	69%-86%
3rd trimester	25	3	25	100	16	64	45%-83%
No prenatal care	4	0	4	100	3	75	32%-100%
Birth Attendant Type							
MD	901	90	875	97	583	67	63%-70%
DO	36	4	33	92	26	79	65%-93%
Certified midwife	60	6	57	95	43	75	64%-87%
Other	3	0	3	100	2	67	12%-100%

CI=Confidence Interval

* Births randomly sampled and the percent of all sampled births in category.

† Number of medical charts reviewed and the percent of the sample that had a chart review.

‡ Number of reviewed charts that had evidence of prenatal HIV antibody testing and the percent of all charts reviewed.

§ Counties that are part of the Milwaukee Metropolitan Statistical Area (MSA), exclusive of Milwaukee County. These include Ozaukee, Washington, and Waukesha counties.

¶ Other Wisconsin counties designated as metropolitan by the US Census Bureau are Brown, Douglas, Calumet, Chippewa, Eau Claire, Kenosha, La Crosse, Marathon, Outagamie, Price, Racine, Rock, Sheboygan, St. Croix, and Winnebago counties.

** All other counties. These counties are not designated as metropolitan counties by the US Census Bureau.

Table 2. Rate of Prenatal HIV Testing Among Women Giving Birth in 2003, by Race/Ethnicity and Maternal County of Residence, Wisconsin

	Milwaukee County			Other Counties			All Counties		
Race/ethnicity	**N**	**Tested**	**%**	**N**	**Tested**	**%**	**N**	**Tested**	**%**
White non-Hispanic	98	79	81	672	411	61	770	490	64
Black non-Hispanic	61	54	89	21	13	62	82	67	82
Hispanic	31	29	94	53	45	85	84	74	88
American Indian non-Hispanic	0	0	—	10	8	80	10	8	80
Asian/Pacific Islander non-Hispanic	4	3	75	18	12	67	22	15	68
Total	194	165	85	774	489	63	968	654	68

for labor and delivery, hospitals generally have a mechanism for documenting outpatient prenatal laboratory testing on the inpatient chart. It is possible, however, that in some instances results of HIV testing done prior to hospital admission were not entered into the hospital chart. For this reason, estimates of prenatal HIV testing in this report should be considered minimum estimates.

Between 1983 and 2003 a total of 79 perinatally transmitted HIV cases were reported to the Division of Public Health, representing 0.9% of total reported cases.[12] Of HIV-infected children reported in Wisconsin, 70% were born to mothers who acquired HIV infection through heterosexual contact; an additional 28% were born to mothers with a history of injection drug use. Perinatal HIV transmission has occurred throughout the state, however, more than half (53%) of perinatally infected children in Wisconsin have resided in Milwaukee County. Racial/ethnic minorities represent a disproportionately high proportion (72%) of infants reported with HIV infection in Wisconsin.

Between 2000 and 2003, 110 infants born to HIV-infected mothers were reported in Wisconsin. Follow-up of these perinatally exposed infants has determined that 11 of these infants were confirmed to be HIV positive; 96 were confirmed to be HIV negative and 3 were either lost to follow-up or had HIV test results pending. Ten mothers gave birth to the 11 HIV infected infants (including a set of twins). Two of the mothers delivered outside of Wisconsin and then moved to Wisconsin where they were later reported. For the 8 mothers who gave birth in Wisconsin, the factors contributing to the occurrence of perinatal HIV transmission are summarized in Table 3.[12]

It might be expected that prenatal HIV testing rates would be higher among populations at greatest risk, and to some degree these data support that notion. The highest prenatal HIV testing rate was found in Milwaukee County. Prenatal HIV testing rates were also higher for Hispanic mothers, a group that has been disproportionately impacted by HIV infection both nationally and in Wisconsin. However, while the black non-Hispanic population has the highest rate of HIV infection of any racial/ethnic group in Wisconsin, these data suggest that when residence is taken into consideration, prenatal HIV testing rates of black non-Hispanic and white non-Hispanic mothers are similar. The reason for this is not clear.

Wisconsin law (ss.252.15) requires specific informed consent in writing before any individual (including pregnant women) may be tested for HIV. This approach is referred to as the "opt-in" approach and is the most common prenatal HIV testing approach in the United States. The rate of prenatal HIV testing found in this evaluation is consistent with findings reported from other opt-in states. Between 1998 and 2001, estimates of prenatal HIV testing rates from 6 opt-in states were between 25% and 69%.[13] Prenatal HIV testing rates in 3 opt-in Canadian provinces ranged from 54% to 83% during that period.

In a 1998 report, the Institute of Medicine (IOM) analyzed the barriers to prenatal HIV testing and concluded that prenatal HIV testing should be simplified and made routine. The IOM recommendation is referred to as the "opt-out" approach.[10,14,15] In the opt-out approach, pregnant women are notified that an HIV test will be included in the standard battery of prenatal tests for all pregnant women. The HIV test is automatically performed unless the pregnant woman specifically declines HIV testing. The opt-out approach is practiced in 4 states (Arkansas, Michigan, Tennessee, and Texas).[13] Opt-out jurisdictions generally report higher prenatal HIV testing rates than opt-in jurisdictions. Tennessee reported a prenatal HIV testing rate of 85% during 1990-1999. Two Canadian provinces using the opt-out approach had prenatal HIV testing rates of 98% and 94% during 2000-2001.

A 2002 survey of Wisconsin prenatal care providers showed a gap between broad support for the concept of HIV testing of pregnant women and the imple-

mentation of universal testing (Wisconsin AIDS/HIV Program, unpublished data). While nearly all (97%) of respondents in that survey agreed that HIV testing should be offered to all pregnant women in their community, only 87% reported they offered HIV testing to all their pregnant patients. Furthermore, this survey indicated that the acceptance of HIV testing by pregnant women in Wisconsin is less than optimal. Acceptance rates varied, but a seventh of prenatal care providers reported that less than half of pregnant patients accepted HIV testing when offered. Perception of low risk is the primary reason some patients are not offered HIV testing and some pregnant women decline HIV testing. This suggests that in contrast to current CDC recommendations for universal HIV testing, some Wisconsin prenatal care providers and their patients continue to view HIV testing as an optional risk-targeted event. These observations indicate that strategies to increase prenatal HIV testing rates will need to address the lingering legacy of risk-targeted testing.

It is important to remember that optimal prevention of perinatal HIV infection requires a sequential series of events, each building on the previous step. Failure to complete any of these steps represents a missed prevention opportunity. While this report is focused on prenatal HIV testing, the first step in perinatal HIV prevention is the timely provision of prenatal care. Without timely prenatal care all subsequent prevention opportunities are lost. Some evidence suggests that pregnant women with HIV infection, particularly those who use illicit drugs, are less likely to receive prenatal care than are other pregnant women.[10]

Another crucial prevention step is the adequate prophylactic treatment of pregnant women with HIV infection and their infants. This requires compliance with the USPHS recommendation that prophylactic treatment be offered to all pregnant women with HIV infection. Furthermore, once prophylactic treatment is initiated, women should receive support to comply with the difficult treatment regimens.

CDC has undertaken an initiative, Advancing HIV Prevention, with a goal of decreasing the number of new HIV infections in the United States. One major component of this initiative is to further decrease mother-to-child HIV transmission by promoting HIV screening of every pregnant woman in the United States.[16] This report indicates that 9 years after the landmark PACTG 076 study demonstrated that perinatal transmission could be largely prevented, the goal of universal prenatal HIV testing has not been reached in many states, including Wisconsin.

Table 3. Factors Contributing to Perinatal HIV Infection Transmission Among 8 Women Who Delivered HIV Infected Infants in Wisconsin, 2000-2003

Factor: No or very late prenatal care

- Mother 1 had no prenatal care and was never tested before delivery. She delivered at home, was subsequently taken to the hospital and was tested. Her infant was started on antiretrovirals within 1 day of delivery.
- Mother 2 had no prenatal care and was first tested at labor and delivery. Her infant's physician initiated antiretroviral treatment in the infant later in the day when the mother's HIV EIA test result was found to be positive.
- Mother 3 had no history of prenatal care prior to moving to Wisconsin and was tested at week 37. Treatment was initiated at week 39 when the HIV reactive test results were received.

Factor: Inadequate HIV testing

- Mother 4 was offered HIV testing early in pregnancy but declined because she believed she was not at risk. The infant was diagnosed with *Pneumocystis carinii* pneumonia and subsequently tested HIV positive at age 3 months.
- Mother 5 tested HIV negative 6 weeks into pregnancy. She apparently seroconverted later in pregnancy and was not re-tested.
- Mother 6 had received some prenatal care, but refused HIV testing. She presented to the emergency department at 25 weeks with ruptured membranes and was tested for HIV at this time. She was admitted and delivered at 26 weeks. She received antiretrovirals 2 days prior to and during labor and delivery. Her infant also received antiretroviral treatment.

Factor: Testing early in pregnancy but not adequately treated or non-compliant

- Mother 7 received limited early prenatal care and tested HIV positive in another state. She reported that she was not informed of her HIV status and was not treated at that time. She moved to Wisconsin at 34 weeks and was re-tested. Treatment was initiated when the test results were known at week 35.
- Mother 8 tested HIV positive early in the second trimester of pregnancy. Treatment was initiated but the mother did not comply.

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