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State Mandated Prenatal Human Immunodeficiency Virus Screening at a Large Community Hospital

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ABSTRACT—Purpose: To describe the initial experience of state mandated prenatal HIV screening at a large community hospital. **Methods:** HIV screening was provided to all pregnant women as of October 1, 1999. All HIV-positive women identified received aggressive antiretroviral therapy to reduce the likelihood for vertical transmission. Neonates were screened for HIV at zero, six, and 12 months of age. **Results:** Seven pregnant women (0.3%) and two additional family members tested positive for HIV. All seven infants born to the identified HIV-positive women have tested negative for infection. We estimated that six of nine cases of HIV infection identified would have been missed under a policy of voluntary HIV screening. **Conclusions:** Universal screening for HIV in pregnancy is achievable and desirable and provides the best opportunity to minimize the number of new neonatal HIV infections.

Introduction

INFECTION with the Human Immunodeficiency Virus (HIV), the virus responsible for Acquired Immunodeficiency Syndrome (AIDS) remains a significant public health concern. Although available drug therapies have greatly improved the quality of life and survival times for HIV-infected individuals, death from complications of the infection eventually occurs. Without a cure, preventing the spread of HIV infection is central in controlling the disease. To this end, avoidance of activities associated with HIV transmission is essential.

Pregnant mothers infected with HIV can transmit the virus to their infant during the course of pregnancy and delivery. Vertical transmission of the virus from the HIV-infected gravida to the neonate accounts for the majority of new pediatric HIV infections. This vertical transmission rate can be substantially reduced with aggressive antiretroviral treatment of the HIV-infected mother during the antepartum and intrapartum period combined with neonatal treatment of exposed infants.^{1,2,3} To achieve this benefit, however, one must first identify all infected mothers. Voluntary prenatal screening for HIV infection has improved the rate of antepartum HIV testing in the mother, but still many women go untested.^{4,5} In response to this deficiency of voluntary screening, the State of Connecticut, in October 1999, implemented legislation advising health-care providers to inform patients that HIV screening was part of routine obstetrical care (State of Connecticut, House Bill No. 7501; June 1999 Special Session, Public Act No. 99-2). The purpose of this study is to report on the impact of mandatory prenatal HIV screening at a large community hospital during the initial 10 months following enactment of the legislation.

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Materials and Methods

In October 1999, statewide implementation of Connecticut House Bill # 7501 required health-care providers to inform their pregnant patients that HIV testing is part of routine obstetrical care. Pregnant women would be provided with pre- and post-test counseling and informed of the confidentiality of the test result. The principle features of this legislation regarding antenatal HIV screening were:

1. Health-care providers giving prenatal care to pregnant women in this state shall inform her, or ascertain from the women's medical record that such information has already been provided to her, that HIV testing is part of routine prenatal care and shall inform her of the health benefits to herself and newborn of being tested for HIV infection;
2. HIV testing shall be performed within 30 days of the first examination and again between 26-28 weeks gestation or shortly thereafter;
3. If such testing is not documented in the medical record at time of admission for delivery, HIV testing of the pregnant women will be performed in the absence of written objection; and
4. Newborn HIV screening will be performed unless maternal HIV status is documented.

A team comprised of counselors, a family nurse practitioner, infectious disease, and maternal-fetal medicine specialists coordinated the prenatal HIV-screening program and supervised the treatment of all pregnant HIV-positive women identified. Pregnant women were aggressively managed with highly active antiretroviral treatment. Zidovudine (AZT) was always a component of the antepartum regimen. Change in medical management was based on response to therapy as determined by HIV viral load and maternal CD4 levels. In addition, AZT was administered intrapartum and postnatally to the infant as per the Pediatric AIDS Clinical Trial Group 076 Study prophylaxis regimen.¹ Standard intrapartum practices to lessen the risks of vertical transmission were practiced, e.g. the avoidance of fetal scalp electrodes. Cesarean section was not routinely performed; however, patients were counseled regarding the potential for reduced neonatal transmission with elective cesarean section. Neonatal HIV testing was performed at zero, six, and 12 months of life. The period of study is October 1999 through July 2000.

Results

A total of 2,352 infants were born to 2,239 mothers at our community-based, university affiliated teaching hospital during the study period. The racial profile at our in-

stitution is as follows: white: 62%, hispanic: 17%, black: 14%, other: 7%. The majority of our patients are insured (78%); 22% are uninsured or covered by medicaid. All women delivered during the study period were screened for HIV. Seven pregnant women (0.3%) tested positive for HIV infection. Six of seven women were identified prior to their admission for labor. The seventh patient, having refused voluntary HIV screening earlier in the pregnancy, tested positive for HIV on admission for labor. On follow-up testing, two additional family members of HIV-infected women also tested positive: the 18-month old child of one patient and the spouse of another. Of the nine individuals detected, 8/9 had no prior knowledge of their HIV status. A single patient did not disclose her known HIV-positive status at her initial prenatal visit but acknowledged her positive status after her initial HIV prenatal screen returned positive.

The six HIV-positive pregnant patients detected antenatally agreed to treatment during pregnancy with highly active antiretroviral therapy (HAART) in addition to intrapartum, postnatal AZT treatment. Four of six patients received zidovudine/lamivudine (Combivir) and nevirapine (Viramune) antenatally. The HIV viral load was undetectable at term in three of these women and was reduced to 477 copies in the fourth. Three out of four of these women were delivered vaginally at term; the fourth (undetectable viral load) was delivered at term by repeat cesarean section. A fifth woman received antenatal treatment with zidovudine/lamivudine (Combivir) and abacavir (Ziagen). Her HIV viral load was reduced to undetectable levels by term and she was delivered vaginally. A sixth patient initially treated with zidovudine/lamivudine (Combivir) and nevirapine (Viramune) showed persistent HIV viral load elevations and required the addition of nelfinavir (Viracept). Her HIV viral load was reduced to 420 copies by term when she was delivered vaginally. The patient who tested positive for HIV on admission to labor received no antenatal or intrapartum treatment; however, her infant received neonatal AZT therapy once maternal HIV infection was documented. Her HIV viral load at time of diagnosis was 137,000 copies. All seven infants have tested negative for HIV infection.

Discussion

Early in the history of HIV infection prior to proven drug therapies, anonymous neonatal screening was performed primarily to establish the seroprevalence of HIV infection in pregnancy.^{6,7} Subsequently, with the advent of effective antiretroviral treatments that improved survival, attention was focused on the early identification of infected individuals. In pregnancy, voluntary HIV screening was advocated in an effort to identify HIV-infected women.⁸ With time it became clear that HIV-infected

gravidas could transmit the infection to their infants. Vertical transmission was found to occur in up to 25% of neonates born to untreated HIV-infected mothers.⁹ In 1994, zidovudine therapy administered in the antenatal, intrapartum, and neonatal period could reduce the rate of maternal-infant HIV transmission by two-thirds.¹ Further additions to the HIV treatment armamentarium allowed for greater control of maternal HIV infection and led to further reductions in the vertical transmission rate. With multidrug therapy, maternal-infant transmission rates have been reduced to 1% to 2%.^{2,3} This remarkable success in preventing new cases of neonatal HIV infection can be realized only if the infected gravida is identified and treated. The nature of HIV infection and its public health implications demands a coordinated approach to limit the spread of the infection wherever possible.

In the United States today, mandatory HIV counseling with voluntary screening of pregnant women is the most common form of antenatal screening performed. This screening approach followed the 1995 recommendation of the United States Public Health Service.⁸ Although this antenatal HIV screening policy has succeeded in identifying many infected women, only 58% to 81% of women consent to voluntary screening.⁴ The reasons for refusal of voluntary antenatal HIV screening are many but include both patient and physician factors. Some patients may decline voluntary screening based on a perception of no risk for HIV infection. Other patients, with a history of drug use and/or prior sex partners, may not acknowledge such history and refuse voluntary screening out of fear of arousing suspicion in their current partner. Still other patients at high risk for HIV infection may decline voluntary screening out of fear of testing positive for the infection. The counseling style of the individual physician may have a significant influence on the rate of acceptance of voluntary screening. Physicians who perceive their patients to be without risk for HIV infection or those who fail to recognize the importance of antenatal

Year	Prenatal Case	HIV Positive Infant	HIV Negative Infant
1992	3	3	0
1993	2	0	2
1994	1	0	1
1995	2	1	1
1996	3	1	2
1997	3	0	1*
1998	4	0	3
1999	9	1	8
2000	6	0	6
*status unknown in two infants			

HIV screening may have low rates of patient acceptance for voluntary HIV screening. Conversely, physicians more familiar with the inadequacies of screening based on risk factors alone may be more committed to antenatal HIV screening and thus have a higher percentage of patients accepting testing.¹⁰

The importance of identifying HIV-infected pregnant women and reducing neonatal HIV infection combined with the deficiencies of voluntary prenatal HIV screening led to a change in prenatal HIV screening in the state of Connecticut. A policy of universal prenatal HIV screening was readily integrated by the local health-care providers and universally accepted by patients in our institution. When fully implemented, this revised state policy of mandated prenatal screening would achieve the objective of universal prenatal screening and would afford the

Year	Total n	HIV Positive n (%)	HIV Negative n	HIV Pending n	HIV Unknown n
1995	76	8 (11.9%)	59	0	9
1996	64	4 (6.9%)	54	1	5
1997	68	2 (3.2%)	60	5	1
1998	63	1 (1.9%)	52	9	1
1999	69	4 (6.0%)	63	2	0
2000	74	0 (0%)	60	13	1

best opportunity of preventing vertically acquired neonatal HIV infection. Prior to state mandated prenatal HIV screening, many patients attending the hospital based obstetrics clinic underwent voluntary screening. We assumed that the three patients identified in this hospital-based clinic would have been detected under a policy of voluntary prenatal HIV screening. We estimated the remaining six cases (66.7%) would have gone undetected under the prior policy of voluntary prenatal HIV screening. In the first 10 months of mandated prenatal HIV screening, seven pregnant women were screen positive for HIV. Assuming a 25% vertical transmission rate without therapy, we estimated that two case of neonatal HIV infection were prevented with a policy of mandatory prenatal HIV screening; we estimate that one of these cases would have been missed under a policy of voluntary screening. The prevention of a single case of a lethal disease makes a strong argument for universal HIV screening in pregnancy.

The impact of a policy of universal prenatal HIV screening combined with aggressive antepartum, intrapartum, and neonatal HIV therapy is reflected in our institutional numbers over the past 10 years (Table 1). Under a policy of voluntary screening (1992–1998), one to three cases of HIV in pregnancy were documented. With institution of universal screening, 15 cases were identified between 1999–2000. Prior to AZT monotherapy for prevention of vertical transmission of HIV the vertical transmission rate at our hospital was 40% (2/5). With AZT monotherapy, the vertical transmission rate in infants with known follow up was 29% (2/7). Since the utilization of HAART in pregnancy in 1997, only a single case (1/19, 5.5%) of HIV infection has been documented in exposed neonates. The reduction in neonatal HIV infection documented at our institution has mirrored the success experienced statewide. In the years 1995–2000, the reported number of prenatal HIV cases has remained relatively constant (Table 2). A slight increase in the number of prenatal HIV infection was recorded in the first two years (1999, 2000) of mandated prenatal HIV screening. In contrast, the rate of neonatal HIV infection has declined from 11.9% in 1995 to 1.9% after mandated HIV screening. In 2000, the first full year of mandated prenatal HIV screening, all sixty neonates with known follow-up born to HIV-positive mothers have tested negative for the infection (Connecticut Department of Public Health, Connecticut HIV/AIDS Statistics Through December 31, 2001, www.dph.state.ct.us/BCH/infectiousdise/aids_case_data.htm).

Despite a marked reduction in the number of perinatally acquired HIV infants from a peak of 1,000–2,000 during the early 1990s, an estimated 300–400 babies continue to be born with HIV yearly in the United States. Many of these infants are born to women who were not tested for

HIV before delivery (CDC data, 2001). The initiative towards universal prenatal HIV screening was outlined in the United States Public Health Service revised statement regarding HIV screening of pregnant women issued in 2000.¹¹ In our experience, universal screening for HIV in pregnancy was readily accepted by the informed patients and proved highly effective. As illustrated by the institutional and statewide data presented, universal screening for HIV infection in pregnancy affords the best opportunity to prevent many cases of neonatal HIV infection that continue to occur with voluntary prenatal HIV screening. Prevention of HIV is less costly than treatment. It is likely that a policy of universal screening for HIV in pregnancy may prove cost effective.^{12,13} The tremendous individual and societal burden of HIV infection warrants an aggressive health-care policy to reduce the spread of the infection. The time for voluntary screening for HIV infection in pregnancy has passed. With the advent of effective antenatal and neonatal therapies to prevent new cases of neonatal HIV infection, the time for universal prenatal HIV screening has arrived.

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