Reducing mother-to-child HIV transmission in Canada

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In high-income countries such as Canada, the United States and in Western Europe, great strides have been made in reducing mother-to-child transmission (also called vertical transmission) of HIV. This has come about because the following steps have been instituted:

- offering HIV testing to pregnant women
- offering prenatal care for HIV-positive pregnant women
- the use of potent combination HIV therapy (commonly called ART or HAART) during pregnancy
- intravenous AZT (zidovudine, Retrovir) for the mother during delivery
- six weeks of oral anti-HIV therapy for the infant after birth
- use of formula rather than breast milk for feeding (breast milk can contain HIV)
- HIV-positive parents not pre-chewing food for infants (this can sometimes transmit HIV)

By implementing all of these steps, HIV-positive mothers can give birth to a healthy HIV-negative infant and maintain their child’s health as it develops.

As part of the Canadian Perinatal HIV Surveillance Program (CPHSP), researchers have been studying vertical transmission and ways to minimize it for the past 20 years. In their latest report they document profound reductions in vertical transmission that have occurred in Canada during the study. Their report, published in the journal *AIDS*, points to future directions for research and support so that the rate of vertical transmission can be further reduced.

Study details

Researchers collected health-related information about pregnant HIV-positive women and their infants between 1990 and 2010, from 22 health departments in all Canadian provinces and territories.

The HIV status of the infants in the study was confirmed in one or more ways, as follows:

- testing two separate blood samples for HIV’s genetic material by PCR (polymerase chain reaction)
- culturing HIV from blood samples
- the presence of HIV antibodies in the infant’s blood 18 months after birth

The researchers divided their study into the following two time periods:

- before 1997
- 1997 and later

This division was necessary because the availability of HAART in 1997 greatly changed most doctors’ approaches to managing pregnancy in HIV-positive women.

The study team focused on 2,692 mothers and their infants.

The CPHSP’s data was analysed by the Canadian HIV Trials Network (CTN), which is funded by the Canadian Institutes of Health Research (CIHR). CPHSP’s work is supported by the Public Health Agency of Canada.
Results—Factors affecting transmission of HIV

Researchers noticed a decline in vertical transmission after 1994, when clinical trial results found that the drug AZT greatly reduced mother-to-child transmission. An even greater reduction in HIV transmission occurred after HAART became widely available in 1997.

Overall, there was a transmission rate of 5% in the study. However, this figure masks changes in transmission that occurred over time. For instance, transmissions were distributed as follows:

- before 1997 - 20% of infants were infected
- 1997 and later - 3% of infants were infected

But the figures for 1997 and later can be broken down, revealing further differences in transmission rates as follows:

- among mothers who used HAART - 1% of infants were infected
- among mothers who were prescribed only one or two anti-HIV drugs - 1.6% of infants were infected
- among mothers who did not receive any anti-HIV treatment - 16% of infants were infected

Timing of HAART makes a difference

The researchers investigated the timing of initiating HAART among pregnant women and found that there were differences in infection rates of their infants as follows:

- among women who started HAART more than four weeks before they gave birth - 0.4% of their infants were infected
- among women who used HAART for less than four weeks while pregnant - 9% of their infants were infected

The research team did not provide details as to why some women did not receive HAART.

Delivery methods

Starting in 1999, the researchers’ database consistently collected information about how babies were delivered. Between 1999 and 2010, about 60% of births were vaginal and 40% were Caesarian (C-section). The overall rates of HIV transmission between these two modes of delivery were as follows:

- vaginal delivery - 2.8% of infants were infected
- C-section - 1.9% of infants were infected

These differences in infection rates between the two modes of delivery were not statistically significant.

However, the mode of delivery appeared to have a significant impact on HIV transmission depending on whether or not the woman used anti-HIV therapy. Among women who used HAART, having a vaginal delivery or C-section did not result in statistically significant differences in the rates of infection as indicated below:

- mothers who used HAART and who had a vaginal delivery - 0.6% of infants were infected
- mothers who used HAART and had a C-section - 1.4% of infants were infected

Among women who did not use HAART, differences in infection rates emerged when analysed by delivery method:

- mothers who used no, one or two anti-HIV drugs during pregnancy and had a vaginal delivery - 10.3% of infants were infected
- mothers who used no, one or two anti-HIV drugs during pregnancy and had a C-section - 3.8% of infants were infected

Across Canada

Mother-infant pairs were distributed across Canada as follows:

- Ontario - 33%
- Quebec - 28%
British Columbia – 15%
Alberta – 14%
Saskatchewan and Manitoba – 9%
Atlantic provinces – 1%

During the study period, one HIV-positive mother gave birth in northern Canada (North West Territories, Nunavut, Yukon).

**Changes in ethno-racial groups**

Women in the study self-reported their race/ethnicity. Based on these self-reports, the ethno-racial distribution of women was as follows:

- Black – 46%
- White – 28%
- Aboriginal – 19%
- Asian – 3%
- Latin American – 1%
- unknown – 3%

Over the course of the study, the overall proportion of White women fell from 47% before 1997 to 25% after 1997. In contrast, in the same time periods, the proportion of Black women increased from 35% to 48% and that of Aboriginal women from 14% to 20%.

**Risk factors**

Unprotected sex with a man was the most common HIV transmission risk factor for women in the study (65%). This was followed by injecting street drugs (25%) and receipt of contaminated blood or blood products (1%).

**In perspective**

The present study demonstrates the profoundly beneficial protective effect of HAART on the fetus. The overall vertical transmission rate among women who used HAART in Canada is about 1%. Among women who initiated HAART well before the final four weeks of pregnancy, the transmission rate fell to 0.4%. These figures are similar to those reported from other high-income countries such as the UK, Ireland and France. However, much work remains to be done so that the figure in Canada can fall to zero.

**Not in care**

According to the research team, since 1997 very few infants—about one or two per year—were born in Canada to HIV-positive mothers who did not receive HIV care during pregnancy. Among such infants, about 50% were HIV positive by the time health care workers could conduct HIV testing three to nine months after they were born.

The study team did not provide details about why these women apparently were not tested for HIV while pregnant. However, the researchers suggest that some of these women are “likely from marginalized populations who do not access [medical and social services during pregnancy].”

**Not getting HAART**

Another problem that researchers found is that since 2006 each year between 2% and 6% of HIV-positive mothers did not receive prenatal care or were not prescribed HAART. According to the researchers, one reason that may explain some of these cases is that HIV infection was not diagnosed until delivery or after delivery.

**Improving care**

To help prevent further cases of vertical transmission, the researchers call for more study and resources to be directed at “more vulnerable populations, including immigrant and Aboriginal women as well as women who use injection drugs.”
REFERENCES:

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