Factors responsible for mother-to-child HIV transmission in Ontario, Canada, 1996-2008

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ABSTRACT

OBJECTIVE: Despite a high uptake of HIV screening and anti-retroviral prophylaxis in Ontario, several cases of mother-to-child (MTC) transmission occur every year. We wished to examine the modifiable factors responsible for MTC HIV transmission in Ontario, in particular HIV testing, antiretroviral prophylaxis and breast-feeding.

METHODS: Using the Ontario data from the Canadian Perinatal HIV Surveillance Program, we examined potential correlates of late maternal HIV diagnosis (i.e., diagnosed at or after delivery) among women delivering from 1996 to 2008. To better understand the factors responsible for MTC HIV transmission, we reviewed the medical charts of 35 HIV-infected infants born in Ontario.

RESULTS: Among the 645 HIV-infected mothers, 85 (13.2%) had late HIV diagnosis. The proportion with late HIV diagnosis significantly decreased during the study period, but did not differ by race/ethnicity group or maternal exposure category. With respect to the mothers of the 35 HIV-infected infants, 27 (77%) were diagnosed with HIV at or after delivery. The reasons no prenatal HIV test was performed were: not offered, offered but refused, no prenatal care, denied HIV testing history, and offered but not done. Reasons for no or incomplete antiretroviral prophylaxis (ARP) among eight mothers diagnosed prior to or during pregnancy were: refused or non-compliant with ARP, and failed to inform care provider of HIV status.

CONCLUSIONS: Despite the recommendation for universal prenatal HIV counseling and voluntary testing adopted in Ontario, MTC transmission continued to occur, mostly due to late HIV diagnosis of the mother. Future work to reduce perinatal HIV infection should focus on enhancing timely HIV testing of pregnant women.

KEY WORDS: HIV; mother-to-child transmission; late diagnosis; antiretroviral prophylaxis (ARP); Ontario; Canada

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Mother-to-child (MTC) transmission is the primary mode by which infants become infected with human immunodeficiency virus (HIV) in Canada. Transmission may occur *in utero*, during labour and delivery or via breast-feeding. Without antiretroviral prophylaxis (ARP), 15-40% of children born to HIV-infected mothers become infected.¹⁻³ In 1994, the AIDS Clinical Trials Group study (ACTG 076) found that zidovudine (ZDV) given to the mother during pregnancy, during delivery and to the infant could reduce the risk of MTC HIV transmission from 25.5% to 8.3%.³ With combination antiretroviral therapy (cART) and optimal pre- and perinatal care, risk of transmission can be reduced to less than 2%.⁴⁻⁶

Identifying HIV-infected pregnant women is critical to prevent MTC HIV transmission. In 1999, Ontario adopted a new recommendation to offer HIV counseling and voluntary HIV testing to all pregnant women in the province. Prenatal HIV testing subsequently increased from 33.2% in early 1999 to 94.6% in 2008.⁷ Despite this increased testing, MTC transmission of HIV continued to occur in Ontario, with 37 documented cases reported from 1999 to 2008. The purpose of our study was to investigate the factors associated with MTC transmission of HIV in Ontario in the cART era, in particular to examine factors which could potentially reduce such transmission. Specifically, we wished to 1) characterize the correlates of late HIV diagnosis among HIV-infected mothers and 2) determine the modifiable factors responsible for transmission, including prenatal HIV testing, use of ARP and breast-feeding.

METHODS

Our study had the following components: to characterize late HIV diagnosis in mothers (Component 1) and to determine specific factors responsible for MTC transmission, including HIV testing, ARP and breast-feeding (Component 2). The Research Ethics Board at the University of Toronto and the three participating hospitals approved the study.

Component 1: Characterizing late HIV diagnosis among HIV-infected mothers

Data pertaining to Ontario was obtained from the Canadian Perinatal HIV Surveillance Program (CPHSP). Since 1991, the

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Conflict of Interest: None to declare.

Table 1. Characteristics of HIV-infected mothers in Ontario from 1996 to 2008

	Mother-infant pairs		HIV-infected infants		Non-infected infants	
		n	% infected	% column*	n	% column*
Total	645	50	7.8%	—	595	—
Study period †						
1996-1998	70	14	20.0%	28.0%	56	9.4%
1999-2001	115	18	15.7%	36.0%	97	16.3%
2002-2004	173	10	5.8%	20.0%	163	27.4%
2005-2008	287	8	2.8%	16.0%	279	46.9%
Region of birth of mother						
Canada	188	10	5.3%	20.4%	178	30.4%
Sub-Saharan Africa	333	28	8.4%	57.1%	305	52.0%
Caribbean	62	6	9.7%	12.2%	56	9.6%
Asia	28	4	14.3%	8.2%	24	4.1%
Other	24	1	4.2%	2.0%	23	3.9%
Unknown	10	1	10.0%		9	
Maternal exposure category						
Injection drug user	50	2	4.0%	4.2%	48	8.6%
HIV-endemic	393	33	8.4%	68.8%	360	64.6%
Heterosexual	159	13	8.2%	27.1%	146	26.2%
Transfusion	3	0	0.0%	0.0%	3	0.54%
Unknown	40	2	5.0%		38	
Race/ethnicity						
White	167	8	4.8%	16.3%	159	27.1%
Black	402	35	8.7%	71.4%	367	62.6%
Asian	30	2	6.7%	4.1%	28	4.8%
Other	36	4	11.1%	8.2%	32	5.5%
Unknown	10	1	10.0%		9	
Antiretroviral prophylaxis †						
Complete prophylaxis	251	3	1.2%	6.0%	248	41.7%
Incomplete prophylaxis	336	8	2.4%	16.0%	328	55.1%
None	58	39	67.2%	78.0%	19	3.2%
Mode of delivery †						
C-section, elective	228	9	3.9%	21.4%	219	38.9%
C-section, emergency	31	0	0.0%	0.0%	31	5.5%
Vaginal	346	33	9.5%	78.6%	313	55.6%
Unknown	40	8	20.0%		32	

* Column percent calculated only among those cases with known values for each variable.

† p<0.05, excludes those with unknown value.

CPHSP has conducted national surveillance of infants and children born to HIV-infected women using data from public health units and pediatric care centres across Canada. CPHSP recently published a detailed report of the results of their surveillance.⁶ We identified 645 infants born in Ontario to HIV-infected mothers from 1996 to 2008. Women were considered to have early HIV diagnosis if: 1) the mother's date of HIV diagnosis was prior to the infant's date of birth, or 2) the mother received antiretroviral prophylaxis during pregnancy for those with unknown date of HIV diagnosis; otherwise they were considered to have late HIV diagnosis. We selected this cut-off on the basis that the second (intrapartum) and third (postpartum) components of ARP could be implemented if HIV were diagnosed prior to delivery. While this might not be as effective in preventing MTC transmission as the full three-component ARP regimen, it provided an easily defined cut-off for intervention and constituted a minimum, if not ideal, time of HIV diagnosis. We classified completeness of ARP as follows: a) complete ARP when the mother received combination antiretroviral therapy during pregnancy and intravenous ZDV during labour and the infant received a six-week course of ZDV (with or without other ARP drugs); b) incomplete ARP when appropriate ARP was not administered during one or two of these periods; c) no ARP when no ARP was given. Maternal exposure category was classified according to a mutually exclusive risk hierarchy based on the most likely source of HIV infection as follows: injection drug user (IDU), born in an HIV-endemic country, heterosexual contact other than in an HIV-endemic country, blood transfusion, clotting factors, and perinatal acquisition.

Table 2. Potential factors associated with late HIV diagnosis among mothers in multivariate logistic regression

	Total	Late HIV diagnosis		Adjusted Odds
		N	%	Ratio (95% CI)
Model 1				
Race/ethnicity				
White	162	24	14.8%	1.00 (Referent)
Black	383	47	12.3%	1.02 (0.59-1.78)
Asian	25	4	16.0%	1.45 (0.43-4.85)
Other	34	5	14.7%	1.46 (0.49-4.39)
Study period				
1996-1998	70	20	28.6%	1.00 (Referent)
1999-2001	115	27	23.5%	0.77 (0.39-1.52)
2002-2004	144	19	13.2%	0.38 (0.19-0.77)
2005-2008	275	14	5.1%	0.13 (0.06-0.28)
Model 2				
Exposure category				
Injection drug user	49	10	20.4%	1.00 (Referent)
HIV-endemic	374	47	12.6%	1.06 (0.47-2.37)
Heterosexual	154	17	11.0%	0.79 (0.32-1.94)
Study period				
1996-1998	70	20	28.6%	1.00 (Referent)
1999-2001	113	26	23.0%	0.72 (0.36-1.43)
2002-2004	134	16	11.9%	0.33 (0.16-0.70)
2005-2008	260	12	4.6%	0.12 (0.05-0.26)

Component 2: Characterizing the modifiable factors responsible for MTC transmission

Medical charts of infants with perinatal HIV infection born from 1999 to 2008 were reviewed to obtain information on laboratory results, mother's immigration status and social history, prenatal care including ARP, adherence and breast-feeding history. Infants were classified as being HIV-infected if they had a positive HIV PCR test prior to 18 months of age or a positive HIV antibody test at age 18 months of age or later. The review of the social history of the mother was assessed for illicit drug use, commercial sex

Table 3. Potential reasons for HIV transmission by exposure category

Exposure category	N	No prenatal care	No prenatal HIV testing	No ARP	Incomplete ARP	Breast-feeding*
HIV-endemic	25	2 (8.0%)	9 (36.0%)	22 (88.0%)	3 (12.0%)	9 (36.0%)
Heterosexual	7	0 (0.0%)	3 (42.9%)	6 (85.7%)	1 (14.3%)	3 (42.9%)
Injection drug user	2	0 (0.0%)	1 (50.0%)	1 (50.0%)	1 (50.0%)	0 (0.0%)
Unknown	1	1 (100%)	0 (0.0%)	0 (0.0%)	1 (100%)	0 (0.0%)
Total	35	3 (8.6%)	13 (37.1%)	29 (82.6%)	6 (17.1%)	12 (34.3%)

* Ten mothers were diagnosed with HIV 3 months to 7 years after delivery; one mother was diagnosed during the delivery and had breast-fed 1.5 months; one mother was diagnosed one year prior to delivery but did not inform care provider – her HIV status was discovered 3 days after delivery and breast-feeding stopped.

work and mental illness. Details of ARP uptake were assessed by the type and timing of drug regimens administered during pregnancy, at delivery and to the infant. We also interviewed doctors, nurses and social workers who had cared for these children for cases with incomplete charts. These interviews focused only on the areas where additional data were required, were carried out for approximately 10 of the 35 cases, and generally lasted 15-20 minutes.

Statistical analyses

Summary statistics were used to describe the characteristics of HIV-infected mothers. Differences in proportions were assessed using χ^2 tests and Fisher's Exact Test when expected cell size was less than five. We performed multivariate logistic regression analysis to identify factors associated with late HIV diagnosis of the mother; we obtained odds ratios and 95% confidence intervals for each independent variable. The earliest period was selected as the referent for the time period variable.

However, we observed strong collinearity between race/ethnicity and exposure category and, therefore, the two variables could not be included in the same model. In fact, 97% of women from the HIV-endemic category were Black and 96% of Black women were classified as HIV-endemic. Thus, the two categories capture essentially the same women. However, because we were interested in the comparisons with other races/ethnicities and other exposure categories, we analyzed the data using two independent models.

We used SAS Version 9.2 (SAS Institute, Cary, NC, USA) for significance testing and logistic regression.

RESULTS

Study population

From 1996 to 2008, 652 infants were born in Ontario to HIV-infected mothers, of whom 50 (7.7%) were HIV-infected and 595 (91.3%) were not infected; for 7 (1.1%), the HIV status of the infant was unknown. Of those with unknown HIV status, 2 died before HIV status could be determined, 1 moved away from Canada, 1 is pending and the remaining 3 were lost to follow-up. The characteristics of the women (n=645) for whom HIV status of their infants was known are presented in Table 1. Most women were either Black (63.3%) or White (26.3%), and were born in either sub-Saharan Africa (52.4%) or Canada (29.6%). Sixty-five percent were born in an HIV-endemic country and 26.3% were otherwise infected heterosexually. The number of infants born to HIV-infected mothers increased from 23 per year in 1996-1998 to 72 per year in 2005-2008. The proportion of HIV-infected infants decreased from 20.0% in the former period to 2.8% in the latter

period. Compared to women whose infants were not infected, mothers of HIV-infected infants were less likely to have been prescribed ARP during pregnancy (22.0% vs. 96.8%, $p<0.0001$) and more likely to have had a vaginal delivery (78.6% vs. 55.6%, $p=0.011$).

Component 1: Characterizing late HIV diagnosis among HIV-infected mothers

Among the 645 HIV-infected women, 529 (82.0%) women were diagnosed prior to the birth of the infant (including women without an HIV diagnosis date but who received ARP during pregnancy) while 85 (13.2%) had late HIV diagnosis. We were unable to determine the timing of HIV diagnosis for 31 (4.8%) women. The proportion of women who had late HIV diagnosis significantly decreased over the study period: 28.6% in 1996-1998, 23.5% in 1999-2001, 14.8% in 2002-2004 and 5.7% in 2005-2008 (χ^2 for trend, $p<0.0001$). A higher proportion of women with injection drug use as a risk factor were diagnosed late compared to women who were born in HIV-endemic countries and women categorized as infected heterosexually (20.4%, 12.8%, and 11.0%, respectively), though the differences were not statistically significant. There was no difference in late diagnosis by race/ethnicity (White 14.8%, Black 12.3%, Asian 16.0% and other 14.7%).

The results of the two regression models are presented in Table 2. In Model 1, late diagnosis was more frequent in non-White racial/ethnic groups compared to White but these differences were not statistically significant. Late diagnosis decreased in later study periods and was significantly lower in the last two periods. With respect to Model 2, late HIV diagnosis did not appear to vary by the mother's exposure category. After adjusting for race/ethnicity, women were less likely to have a late HIV diagnosis in the later years compared with 1996-1998, as in Model 1.

Component 2: Characterizing the modifiable factors responsible for MTC transmission

Thirty-five confirmed cases of MTC transmission of HIV were identified in Ontario from 1999 to 2008. This included 28 (80%) cases from Toronto, 4 (11%) from Hamilton and 3 (9%) from Ottawa.

Potential underlying reasons for vertical HIV transmission in these cases by maternal exposure category are presented in Figure 1 and Table 3. Seventy-seven percent (27/35) of these mothers were diagnosed with HIV at or after delivery, 6 prior to conception and 2 during pregnancy. Seventy-one percent (25/35) were from an HIV-endemic country, 2 were IDU, 7 were infected through heterosexual contact and 1 had unknown risk factors.

Figure 1. Potential reasons for MTC HIV transmission in Ontario, 1999-2008

* One HIV+ at delivery; one tested in first trimester in Ontario, but did not receive results due to move out of province and had prenatal care there, returned to Ontario and had another test one week prior to delivery; two had an HIV-negative prenatal testing and HIV+ partner.

† Tested 3 weeks prior to delivery, but unknown result.

Thirty-four percent (11/35) of these mothers breast-fed their infants.

Of the six mothers diagnosed with HIV prior to conception, all received either no or incomplete ARP. Of these, 4 refused to take ARP or were non-compliant and 2 failed to inform their care provider of their HIV-positive status.

Of the 2 mothers diagnosed during pregnancy, 1 was unaware of her HIV-positive status until two weeks prior to delivery and did not receive antenatal or intrapartum ARP, and 1 was diagnosed at 16 weeks gestation but initiated ARP only nine days prior to delivery.

Among the 27 mothers diagnosed at or after delivery, 5 had a prenatal HIV test, 13 no HIV test, and for 9 the history of prenatal HIV testing was unknown. Among the 5 mothers with a prenatal HIV test, 1 knew her positive HIV status at the time of delivery, 2 were tested 1-3 weeks prior to delivery but did not know their result, and 2, who had HIV-infected partners, had a negative HIV prenatal test during pregnancy (1 tested HIV-negative three months prior to delivery and for the other, the time of the HIV-negative test was unknown) and were infected subsequently. The reasons for no or unknown prenatal HIV test were: not offered (6), offered but refused (2), no prenatal care (3), denied testing history (4), and offered but not done (1).

DISCUSSION

From 1996 to 2008, 652 infants were born in Ontario to HIV-infected mothers, of whom 50 became infected. As in previous

studies, our results revealed that infants with more complete antiretroviral prophylaxis were less likely to become infected (complete ARP 1.2%, incomplete ARP 2.4%, and no ARP 67.2%).^{3,6,8-11} For Canada as a whole from 1997 to 2010, the Canadian Perinatal HIV Surveillance Network (CPHSP) found a vertical transmission rate of 1.0% among infants born to mothers who received cART, 1.6% for women who received mono-therapy or dual-therapy with nucleoside reverse transcriptase inhibitors, and 16.4% for women who received no ARP antenatally. For mothers who received antenatal cART at least four weeks before delivery, the MTC transmission rate was 0.4% compared to 9.0% when started later than four weeks before delivery.⁶ In the UK and Ireland, the transmission rate was 0.8% in women receiving cART at least two weeks before delivery.⁹ A key distinction between the CPHSP data and ours is that the data in the former are restricted to infants of HIV-infected women referred to a CPHSP participating site either before or during pregnancy or within three months following delivery (prospective cohort), whereas our study also included children diagnosed later. As a result, our study includes a higher proportion of cases of vertical transmission and, due to selective recruitment of HIV-positive infants, cannot be used to determine MTC transmission rates as the true denominator is not known.

The increase in overall prenatal HIV test uptake in Ontario and the decline in proportion of pregnant women with late HIV diagnoses in 1999-2001, 2002-2004, and 2005-2008 compared with 1996-1998 confirm the overall effectiveness of the Ontario

Ministry of Health and Long-Term Care policy of offering HIV testing to all pregnant women in Ontario. Nevertheless, our study confirms that challenges remain. Late maternal HIV diagnosis was found in 27 of 35 (77%) vertical HIV transmission cases from 1999 to 2008. Furthermore, a substantial proportion (~7-8%) of HIV-infected women whose infants were not infected had late HIV diagnosis. This latter group is significant from a public health perspective because, while the infants of these mothers were not infected, they could well have been. Thus, our data confirm the need to improve timely HIV testing during pregnancy to further reduce vertical HIV transmission. One solution is to emphasize the role of HIV testing in women contemplating pregnancy in Ontario and to modify testing strategies so that marginalized women who do not access routine prenatal care can still be tested during pregnancy. Our study did not examine in depth the reasons many HIV-infected pregnant women were not tested, in particular whether these were related to the women themselves, their health providers or the organization of health services. With respect to women-related issues, cultural and psychological factors may be important given the sensitivity of HIV testing and the implications of a positive HIV result. Further research on the factors responsible for women not testing would be useful in helping to reduce the barriers to testing.

A second category of missed opportunities relates to women tested antenatally for whom appropriate preventive interventions were nevertheless not implemented in a timely manner. This is exemplified by the two women in our study who were tested antenatally, but whose results were available only after delivery. This problem could readily be rectified through the use of a rapid point-of-care HIV test (or a standard HIV serologic test ordered on an emergency basis if the former option is not available) for women presenting at delivery without an HIV test on record. The Mother-Infant Rapid Intervention at Delivery (MIRIAD) trial found it acceptable and feasible to offer counseling and rapid HIV testing at the time of labour and delivery to women of unknown HIV status.^{12,13} Last, repeat testing of women at high risk of HIV acquisition later in gestation should be considered; this is illustrated by the two cases in our study who tested HIV-negative early in pregnancy and whose partners were known to be HIV-infected. In addition to serodiscordant couple scenarios, repeat testing might be appropriate for women who use intravenous drugs, those involved in the sex trade and those who have multiple sexual partners during pregnancy. The role of routine repeat testing for all women is less clear. A cost-effectiveness analysis in the US found that a second HIV test could prevent perinatal transmissions with a net savings to society when HIV incidence among women of childbearing age is ≥ 1.2 per 1000 person-years.¹⁴

There are several limitations to our study. The CPHSP database does not include the mother's date of birth. Thus, we were unable to examine mother's age in our analyses. Due to loss to follow-up, the final HIV status of some infants was unknown; however, we estimate we would have missed at most only 2-3 children vertically infected with HIV in this way. We also found errors in the database, as we identified one duplicate case, one case incorrectly identified as HIV-infected, one case with incorrect birthplace of the infant, and one case which was not reported to

the CPHSP; thus, there could have been other unidentified errors in the database. Furthermore, in the case review component of our study, the information about the mother's history relied primarily on notes in the infants' chart. However, we also collected such information through interviews with doctors, nurses and social workers; recall bias could have been introduced. Uptake of prenatal care, prenatal HIV testing and breast-feeding history were unknown for some cases, which could have led to inaccuracies in our results. Finally, we examined only some of the modifiable factors potentially responsible for MTC transmission; we did not, however, examine the biologic factors responsible for such transmission, such as maternal viral load and mode of delivery.

While overall HIV test uptake in Ontario has improved dramatically subsequent to the implementation of the Ontario Ministry of Health and Long-Term Care policy of universally offering HIV testing in pregnancy in Ontario,¹⁵ significant gaps remain. The importance of offering HIV testing to all women early in gestation and to women contemplating pregnancy is paramount, as is the need for repeat HIV testing later in gestation for women at significant ongoing risk of HIV acquisition. We need to ensure all pregnant women have access to HIV testing, including those who do not (or cannot) access routine prenatal care. HIV testing should be timed to allow for early initiation of ARP. For women presenting late in gestation with unknown HIV status, rapid HIV testing is clearly warranted and could prevent some MTC transmissions.

REFERENCES

1. Newell ML, Peckham C. Vertical transmission of HIV infection. *Acta Paediatr* 1994;400(suppl):43-45.
2. Mofenson L. Epidemiology and determinants of vertical HIV transmission. *Semin Pediatr Infect Dis* 1994;5:252-65.
3. Connor EM, Sperling RS, Gelber R, Kiselev P, Scott G, O'Sullivan MJ, et al. Reduction of maternal-infant transmission of HIV-1 with zidovudine treatment. *N Engl J Med* 1994;331:1173-80.
4. European Collaborative Study. Mother-to-child transmission of HIV infection in the era of highly active antiretroviral therapy. *Clin Infect Dis* 2005;40(3):458-65.
5. Cooper ER, Charurat M, Mofenson L, Hanson IC, Pitt J, Diaz C, et al. Combination antiretroviral strategies for the treatment of pregnant HIV-1-infected women and prevention of perinatal HIV-1 transmission. *J Acquir Immune Defic Syndr* 2002;29(5):484-94.
6. Forbes JC, Alimenti AM, Singer J, Brophy JC, Bitnun A, Samson LM, et al. A national review of vertical HIV transmission. *AIDS* 2012;26(6):757-63.
7. Remis RS, Swantee C, Liu J. Report on HIV/AIDS in Ontario 2008. Dalla Lana School of Public Health, University of Toronto. April 2010. Available at: http://www.ohemu.utoronto.ca/doc/2011/PHERO2008_report_final_rev_Sept2010.pdf (Accessed September 20, 2012).
8. Forbes JC, Money DM, Remple PV, Burdge DR. Effect of antiretroviral use on HIV vertical transmission rate and injection drug use on adherence in British Columbia, Canada. *Can J Infect Dis* 2000;11:46B (Abstract 246P).
9. Townsend C, Cortina-Borja M, Peckham C, de Ruiter A, Lyall H, Tookey PA. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. *AIDS* 2008;22:973-81.
10. McDonald A, Zurynski Y, Wand H, Giles ML, Elliott EJ, Ziegler JB, et al. Perinatal exposure to HIV among children born in Australia, 1982-2006. *Med J Aust* 2009;190:416-20.
11. Birkhead G, Pulver W, Warren B, Hackel S, Rodríguez D, Smith L. Acquiring human immunodeficiency virus during pregnancy and mother-to-child transmission in New York: 2002-2006. *Obstet Gynecol* 2010;115:1247-55.
12. Bulterys M, Jamieson DJ, O'Sullivan MJ, Cohen MH, Maupin R, Nesheim S, et al. Rapid HIV-1 testing during labor: A multicentre study. *JAMA* 2004;292:219-23.
13. Keenan-Lindsay L, Yudin MH, Boucher M, Cohen HR, Gruslin A, MacKinnon CJ, et al. HIV screening in pregnancy. *J Obstet Gynaecol Can* 2006;28(12):1103-07.
14. Sansom SL, Jamieson DJ, Farnham PG, Bulterys M, Fowler MG. Human immunodeficiency virus retesting during pregnancy: Costs and

effectiveness in preventing perinatal transmission. *Obstet Gynecol* 2003;102(4):782-90.

15. Remis RS, Merid F, Palmer RWH, Whittingham E, King SM, Danson NS, et al. High uptake of HIV testing in pregnant women in Ontario, Canada. *PLoS One* 2012;7(11):e48077.

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RÉSUMÉ

OBJECTIF : Malgré le recours élevé au dépistage du VIH et à la prophylaxie antirétrovirale en Ontario, plusieurs cas de transmission de la mère à l'enfant (TME) surviennent chaque année. Nous avons voulu examiner les facteurs modifiables de la TME du VIH en Ontario, en particulier le dépistage du VIH, la prophylaxie antirétrovirale et l'allaitement maternel.

MÉTHODE : À l'aide des données ontariennes du Programme de surveillance périnatale du VIH au Canada, nous avons examiné les corrélats possibles du diagnostic maternel tardif du VIH (c.-à-d. durant ou après l'accouchement) chez les femmes ayant accouché entre 1996 et 2008. Pour mieux comprendre les facteurs de la TME du VIH, nous avons examiné les dossiers médicaux de 35 nourrissons infectés par le VIH nés en Ontario.

RÉSULTATS : Sur les 645 mères infectées par le VIH, 85 (13,2 %) avaient reçu un diagnostic tardif. La proportion de mères ayant reçu un diagnostic tardif du VIH a beaucoup diminué au cours de la période de l'étude, mais ne différait pas selon la race/le groupe ethnique, ni la catégorie d'exposition des mères. En ce qui a trait aux mères des 35 nourrissons infectés par le VIH, 27 (77 %) avaient reçu un diagnostic de VIH durant ou après l'accouchement. Les raisons de l'absence de dépistage prénatal du VIH étaient les suivantes : dépistage non offert; dépistage offert, mais refusé; pas de soins prénatals; déni des antécédents de dépistage du VIH; et dépistage offert, mais non effectué. Les raisons pour lesquelles la prophylaxie antirétrovirale (PAR) était incomplète ou absente chez les huit mères diagnostiquées avant ou pendant leur grossesse étaient les suivantes : refus ou non-observance de la PAR; et omission d'informer le fournisseur de soins de l'état sérologique relativement au VIH.

CONCLUSIONS : Malgré la recommandation adoptée en Ontario d'offrir universellement le counseling prénatal sur le VIH et le dépistage volontaire du VIH, la TME continue à survenir, surtout en raison du diagnostic tardif du VIH chez les mères. Les futurs efforts de réduction des infections périnatales par le VIH devraient être axés sur l'amélioration du dépistage rapide du VIH chez les femmes enceintes.

MOTS CLÉS : VIH; transmission mère-enfant; diagnostic tardif; prophylaxie antirétrovirale; Ontario; Canada