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Mode of Delivery and Infant Respiratory Morbidity Among Infants Born to HIV-1-Infected Women

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Abstract

OBJECTIVE—To estimate risk of infant respiratory morbidity associated with cesarean delivery before labor and ruptured membranes among HIV-1-infected women.

METHODS—In a prospective cohort study of HIV-1-infected women and their infants, mode of delivery was determined by clinicians at the participating sites. For this analysis, “elective cesarean delivery” was defined as any cesarean delivery, regardless of gestational age, without labor and with duration of ruptured membranes of less than 5 minutes. Nonelective cesarean deliveries were those performed after the onset of labor, rupture of membranes, or both. Vaginal delivery included normal spontaneous and instrument deliveries. Associations between mode of delivery and infant respiratory morbidity were assessed using χ^2 or Fisher’s exact test. Adjusted odds of respiratory distress syndrome by delivery mode were assessed using multivariable logistic regression.

RESULTS—Among 1,194 mother–infant pairs, there were significant differences according to mode of delivery in median gestational age (weeks) at delivery (vaginal, $n=566$, median=38.8; nonelective cesarean, $n=216$, median=38.0; and elective cesarean, $n=412$, median 38.1; $P<.001$) and incidence of respiratory distress syndrome (vaginal, $n=9$, 1.6%, reference; nonelective cesarean, $n=16$, 7.4%; elective cesarean, $n=18$; 4.4%; ($P<.001$). In analyses adjusted for gestational age and birth weight, mode of delivery was not statistically significantly associated

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For a list of IMPAACT Protocol 1025 study sites and participants, see the Appendix online at <http://links.lww.com/AOG/A188>.

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with infant respiratory distress syndrome ($P=.10$), although a trend toward an increased risk of respiratory distress syndrome among infants delivered by cesarean was suggested (nonelective cesarean adjusted odds ratio [OR] 2.32, 95% confidence interval [CI] 0.95–5.67; elective cesarean OR 2.56, 95% CI 1.01– 6.48).

CONCLUSION—Respiratory distress syndrome rates associated with elective cesarean delivery among HIV-1-infected women are low, comparable with published rates among uninfected women. There is minimal neonatal respiratory morbidity risk in near-term infants born by elective cesarean delivery to HIV-1-infected women.

LEVEL OF EVIDENCE—II

Over the past 20 years, there has been tremendous progress in the reduction of mother-to-child transmission of HIV-1 in the United States and other countries. This decrease in mother-to-child transmission of HIV-1 is temporally related to an increase in the use of antiretrovirals (for prophylaxis or for treatment) during pregnancy and in delivery by cesarean before labor and before ruptured membranes (elective cesarean delivery). The European mode of delivery trial randomized HIV-1-infected women to delivery at 38 weeks to avoid the onset of labor and successfully halved the risk of mother-to-child transmission.¹ Based on the results of this trial and of an individual patient data meta-analysis of prospective cohort studies in North America and Europe,² both the American College of Obstetricians and Gynecologists and the U.S. Public Health Service have issued guidelines indicating that elective cesarean delivery is recommended for HIV-1-infected pregnant women with peripheral blood viral loads greater than 1,000 copies/mL irrespective of antiretroviral regimen.^{3,4} From 1994 to 2000, cesarean delivery rates increased among HIV-1-infected women in the United States from 20% to 50%.⁵ Data from the European Collaborative Study suggest there may be some benefit of elective cesarean delivery even in pregnancies in which the viral load is undetectable (200 copies/mL or lower, depending on clinical assay).⁶ Elective cesarean delivery is likely to remain an important tool in the prevention of mother-to-child transmission of HIV-1 in the United States and elsewhere.

Cesarean delivery is associated with higher rates of maternal morbidity, delivery cost, occupational risk to the operative team, and neonatal morbidity.⁷⁻¹⁵ Neonates delivered by elective cesarean long have been recognized to be at increased risk for respiratory morbidity.¹⁶⁻²¹ The risk of respiratory morbidity with elective cesarean delivery is directly correlated with gestational age, with neonates delivered at 39 weeks or greater having rates that more closely approximate the rate with vaginal delivery.²⁰ The American College of Obstetricians and Gynecologists recommends that elective cesarean delivery be performed at 39 completed weeks of gestation or later to avoid iatrogenic prematurity³ but recommends that cesarean delivery for prevention of mother-to-child transmission of HIV-1 be performed at 38 completed weeks to avoid the onset of labor and rupture of membranes.³ Our objective was to estimate risk of infant respiratory morbidity associated with cesarean delivery before labor and ruptured membranes among HIV-1-infected women.

METHODS

The International Maternal Pediatric, and Adolescent AIDS Clinical Trials Network (IMPAACT) Protocol 1025 (formerly PACTG 1025) is an ongoing, multi-center observational cohort study of HIV-1-infected pregnant women in the United States and Puerto Rico. Enrollment began in 2002 and is ongoing. All sites have institutional review board approval before enrolling participants. Participants are recruited from early second trimester until 14 days after delivery. Data are collected through maternal interview, medical record data abstraction, and physical examination. Maternal study visits occur four times during pregnancy, at delivery, and at 6 weeks, 3 months, and 6 months postpartum. Child

visits occur at birth, at 2 and 6 weeks of age, and at 4 and 6 months of age.^{22,23} Neonatal diagnoses were recorded according to the IMPAACT Pediatric Diagnoses Appendix 40.²⁴ The specific aim of assessing respiratory morbidity in neonates delivered by cesarean delivery was refined after the P1025 study was ongoing.

The study population comprised infants born to women with an estimated date of delivery on or before February 29, 2008. Women with incomplete mode of delivery data and infants of unknown gestational age, with a gestational age at delivery of less than 20 weeks, with cardiopulmonary congenital anomalies, or part of multiple gestation pregnancies were excluded from the study population. Only the first birth on study per woman was included. Only live births were included.

Mode of delivery was determined by clinicians at the participating sites. For this analysis, “elective cesarean delivery” was defined as any cesarean delivery, regardless of gestational age, without labor and with duration of ruptured membranes of 5 minutes or less. Nonelective cesarean deliveries were those performed after the onset of labor, rupture of membranes, or both. Vaginal delivery included normal spontaneous and instrument deliveries. The identification of neonatal respiratory morbidities was based on site clinical evaluation as recorded on P1025 study visit case report forms. For this analysis, respiratory morbidity was defined as any site-assigned diagnosis of respiratory distress syndrome, transient tachypnea of the newborn, meconium aspiration, or pneumothorax. All neonatal respiratory morbidity data were reviewed by two study clinicians (E.G.L. and J.S.R.). For this analysis, only diagnoses reported to have occurred within the first 28 days of life were reviewed. Supporting clinical data (clinical course, radiologic diagnosis, culture results, need for supplemental oxygen, use of surfactant) of coded pediatric diagnoses of respiratory morbidities defined as outcomes for this analysis were reviewed. If the diagnosis was unclear, the individual site was queried for confirmation and categorization of the neonatal outcome.

The antiretroviral regimen closest to delivery was categorized into mutually exclusive categories according to the following hierarchy: 1) protease inhibitor-containing regimens; then 2) nonnucleoside reverse transcriptase inhibitor-containing regimens; then 3) nucleoside or nucleotide analog reverse transcriptase inhibitor-containing regimens; and then 4) no antiretrovirals. Preterm birth was defined as a birth at less than 37 completed weeks of gestation. Low birth weight was defined as a birth weight of less than 2,500 g. Parity was defined as a delivery after 20 weeks of gestation. Women categorized as having diabetes were those identified as such by the clinician at the study site.

An a priori sample size calculation, conducted in the P1025 protocol for a similar study specific to term infants, found that a sample of approximately 700 term infants would be required to observe a fivefold increase in risk of respiratory distress syndrome with 80% power. Univariable associations between the characteristics of the study population and the primary exposure of interest, mode of delivery, were examined using the χ^2 test or the Fisher’s exact test from the StatXact PROCS 6.3 software (Cytel Inc., Cambridge, MA). Univariable associations between characteristics of the study population, including mode of delivery, and infant respiratory morbidity also were examined using the χ^2 or Fisher’s exact test. A Kruskal-Wallis test was used for median comparison.

Multiple logistic regression analysis was used to estimate the association between mode of delivery and infant respiratory morbidity adjusting for potential confounders. First, a crude model was fit to estimate the unadjusted association of mode of delivery and infant respiratory morbidity. Potential confounders (associated with both mode of delivery and infant respiratory morbidity with a *P* value of $\leq .10$) were identified from the univariable

analyses described previously. These potential confounders were added individually to the crude model, and if the crude odds ratio (OR) for mode of delivery changed by more than 10%, the confounder was kept in the final model. A decision to include maternal race and ethnicity and infant sex in final modeling was made a priori. The adjusted ORs and the 95% confidence intervals (CIs) for mode of delivery and the confounders were estimated from the final model.

RESULTS

Of 1,399 infants born to women with an estimated date of delivery on or before February 29, 2008, 1,194 met inclusion criteria for these analyses. Figure 1 depicts the derivation of the study population.

Overall, 566 (47%) women were delivered vaginally, 216 (18%) by nonelective cesarean, and 412 (35%) by elective cesarean delivery. Participants recruited intrapartum or postpartum had higher rates of cesarean delivery (Table 1). Figure 2 depicts the mode of delivery by birth year. Overall, cesarean delivery rates ranged from 49% to 54%. There was no significant association of mode of delivery by year of delivery ($P=.71$). The most common primary indications for elective cesarean were interruption of HIV-1 transmission (39.3%), repeat (29.8%), participant request (5.8%), nonreassuring fetal heart rate (4.8%), and hypertension or preeclampsia (4.6%). For nonelective cesarean delivery, the most common primary indications were nonreassuring fetal heart rate (21.8%), interruption of HIV-1 transmission (21.3%), repeat (17.1%), and labor arrest disorder (9.3%). There were significant differences in the median infant gestational age (weeks) at delivery according to mode of delivery: vaginal (median=38.8; 25th and 75th percentile=37.6, 39.7), nonelective cesarean delivery (median=38.0; 25th and 75th percentile=36.4, 39.4), and elective cesarean delivery (median 38.1; 25th and 75th percentile=37.7, 38.4) ($P<.001$).

Characteristics of the study population, overall and according to mode of delivery, are shown in Table 1. Several maternal characteristics were associated ($P\leq.10$) with mode of delivery: race and ethnicity, parity, timing of study enrollment, maternal diabetes, and CD4 count and plasma viral load closest to delivery. Infant characteristics by mode of delivery also are shown in Table 1. The overall rate of preterm birth was 16.9% and of low birth weight was 13.0%. Preterm infants and low-birth-weight infants were more likely to be delivered by nonelective cesarean. The overall rate of mother-to-child transmission of HIV-1 was 0.4%.

Overall, 43 (3.6%) of infants had respiratory distress syndrome, 36 (3.0%) had transient tachypnea of the newborn, 12 (1.0%) had meconium aspiration, four (0.3%) had pneumonia, and one (0.1%) had pneumothorax. As a result of small numbers of cases of meconium aspiration, pneumonia, and pneumothorax, no further analyses of these outcomes were conducted. Associations between mode of delivery with respiratory distress syndrome and with transient tachypnea of the newborn are shown in Table 2. Mode of delivery was associated with respiratory distress syndrome ($P=.001$) but was not associated with transient tachypnea of the newborn ($P=.37$).

The distribution of gestational ages according to mode of delivery for those 43 infants with respiratory distress syndrome is shown in Figure 3. The majority of infants with respiratory distress syndrome had gestational ages at birth of 34 weeks or greater. Over 30% had gestational ages at birth of more than 37 weeks. The proportions of infants with respiratory distress syndrome were: 37 weeks (7 of 219 [3.4%]), 38 weeks (4 of 388 [1.0%]), and 39 weeks (3 of 208 [1.1%]). There were no cases of respiratory distress syndrome at 40 weeks or beyond in 177 infants. Fisher's exact comparison of mode of delivery and respiratory

distress syndrome among term infants showed no significant difference (but may be prone to type 2 error as a result of low numbers of cases).

In evaluation of the infants with respiratory distress syndrome, timing of study enrollment, maternal viral load, infant gestational age at delivery, and infant low birth weight were associated with respiratory distress syndrome in univariable analyses and were considered as potential confounders in multivariable analyses. Although gestational age and low birth weight are related to one another, multivariable analysis results were similar when either variable was dropped. The final multivariable logistic regression model assessed the association between mode of delivery and infant respiratory distress syndrome adjusting for maternal race and ethnicity and infant sex (identified a priori), maternal plasma viral load closest to delivery, infant gestational age, and infant birth weight. In the final model, there was no statistically significant association between mode of delivery and infant respiratory distress syndrome ($P=.10$) (Table 3). However, there was a trend toward an increased risk of respiratory distress syndrome among infants delivered by cesarean compared with vaginal delivery (elective cesarean delivery compared with vaginal delivery: OR 2.32, 95% CI 0.95–5.67; nonelective cesarean delivery compared with vaginal delivery: OR 2.56, 95% CI 1.01–6.48). Infant preterm birth ($P=.002$) and low birth weight ($P<.001$) were significantly associated with infant respiratory distress syndrome.

DISCUSSION

P1025 is a large ongoing U.S. cohort of HIV-1-infected pregnant women and their infants. The primary objectives are to assess maternal and infant safety and the effectiveness of interventions for prevention of mother-to-child HIV-1 transmission. Several analyses of data from P1025 have already been published.^{23,25-29} The IMPAACT P1025 cesarean rate, ranging from 49% to 54% annually (52.4% overall) through the study period, was remarkably higher than the U.S. average of 30% during this time period.³⁰ However, cesarean delivery rates in P1025 were similar to published rates in other HIV-1-infected populations.³¹ Interruption of HIV-1 infection was listed as the most frequent primary indication for elective cesarean delivery in this P1025 study cohort with percentages that exceeded the proportion of participants with plasma viral loads of 1,000 copies/mL or more. This suggests that frequently cesarean delivery was done as a result of physician or maternal preference. The incidence of infant respiratory distress syndrome was most common among infants delivered by nonelective cesarean with those delivered by elective cesarean delivery at intermediate risk and those delivered vaginally at the lowest risk. However, mode of delivery was not significantly associated with infant respiratory distress syndrome after adjusting for gestational age and birth weight.

The clinical concern that prompted these analyses was that U.S. Public Health Service recommendations for the timing of cesarean delivery for prevention of mother-to-child transmission (38 weeks) might lead to higher rates of neonatal respiratory distress syndrome. In P1025, there were too few numbers of respiratory distress syndrome cases among term infants to compare respiratory distress syndrome rates according to mode of delivery at these later gestational ages. A clinician might gain reassurance that these rates of respiratory distress syndrome in the elective cesarean group at later gestational ages were low. Only 2 of 227 neonates delivered by elective cesarean delivery at 38 weeks had respiratory distress syndrome.

There are several strengths of this study. P1025 is a large U.S. cohort of HIV-1-infected pregnant women and their infants. Approximately 1,200 mother–infant pairs were available for this analysis. These women were delivered from 2002 to 2008, after American College of Obstetricians and Gynecologists-endorsed cesarean delivery for the prevention of mother-

to-child transmission of HIV-1 among women with detectable or unknown viral loads.³ Strengths of this analysis include the large number of participants with prospectively collected data and high rates of cesarean delivery. Weaknesses include a lack of randomization to mode of delivery and a reliance on clinical diagnoses by different clinicians at multiple sites. Randomization of mode of delivery is unlikely to be studied in large numbers as a result of cost. The diagnosis of respiratory distress syndrome is a generally accepted diagnosis with clearly defined symptoms making diagnosis by different clinicians unlikely to have affected results. Although several studies have been undertaken to evaluate effectiveness of cesarean delivery to prevent mother-to-child transmission of HIV-1 and potential maternal morbidity, this is the first study to evaluate neonatal respiratory morbidity according to mode of delivery.³² Published studies of morbidity among neonates of HIV-1-infected women are generally limited to infectious complications or antiretroviral medication side effects.^{6,33} There have been no published analyses specifically addressing neonatal respiratory morbidity according to mode of delivery among HIV-1-infected women. The U.S. Public Health Service guidelines for HIV-1-infected pregnant women recommend that cesarean delivery be done at 38 weeks of gestation by best estimated gestational age without amniocentesis. The guidelines point out that although there is a substantial increase in the risk of infant respiratory distress syndrome with earlier cesarean deliveries, this increased risk must be balanced with the risk of onset of labor or rupture of membranes before 39 weeks of gestation.⁴

More systematic data collection is needed on neonatal morbidity associated with interventions for the prevention of mother-to-child transmission of HIV-1. For HIV-1-infected pregnant women to make informed choices for themselves and their infants related to mode of delivery, they need information regarding both benefits and morbidities associated with cesarean delivery for prevention of mother-to-child transmission of HIV-1. Although neonatal respiratory distress syndrome is readily treatable, especially among near-term infants, it contributes to the morbidity and expense associated with the procedure.²¹ With modern management, long-term sequelae of respiratory distress syndrome generally would be unlikely except in the very preterm infant.³⁴ For that reason, the benefit of cesarean delivery for prevention of mother-to-child transmission of HIV-1 should be weighed against the potential morbidities for the neonate and the mother. Prevention of iatrogenic prematurity is essential if cesarean delivery is to remain an intervention to prevent mother-to-child transmission of HIV-1. The mother with an HIV-1 viral load higher than 1,000 copies/mL may decrease her infant's risk of acquisition of HIV-1 infection from 6% to 2–3%.¹ The benefit of cesarean delivery for prevention of HIV-1 transmission with an undetectable viral load is unknown. If vertically transmitted, HIV-1 infection would require lifelong treatment for the infant. This can be compared with a risk of respiratory distress syndrome at 38 weeks of 1–2%. Respiratory distress syndrome at this gestational age is readily treatable and unlikely to cause long-term problems but may require at least short-term admission to an intensive care nursery.

In this study, the rate of respiratory distress syndrome associated with a policy of elective cesarean delivery for prevention of mother-to-child transmission HIV-1 infection at 38 weeks is low and comparable to those rates published regarding HIV-1-uninfected women.²⁰ The findings of this study support the safety, with respect to neonatal respiratory morbidity, of current use of cesarean delivery for prevention of HIV-1 transmission.

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Fig. 1. Derivation of the study population (n=1,194). Starting number is the total number of infants. Livingston. RDS and Cesarean in HIV-1 Infected Pregnancy. *Obstet Gynecol* 2010.

Fig. 2.

Rates of mode of delivery by birth year (n=1,194). As a result of the partial year data, 2002 and 2008 births were regrouped into 2003 and 2009 births, respectively.

Livingston. RDS and Cesarean in HIV-1 Infected Pregnancy. *Obstet Gynecol* 2010.

Fig. 3.
Gestational age at delivery for neonates with respiratory distress syndrome (RDS) (n=43).
Livingston. RDS and Cesarean in HIV-1 Infected Pregnancy. *Obstet Gynecol* 2010.

Table 1

Characteristics of the Study Population Overall and According to Mode of Delivery

Characteristic	Mode of Delivery			P
	Vaginal (n=566)	Nonelective Cesarean (n=216)	Elective Cesarean (n=412)	
Maternal characteristic				
Maternal age (y)				.50 [*]
Younger than 20	43 (7.6)	13 (6.0)	24 (5.8)	
20–34	425 (75.1)	172 (79.6)	327 (79.4)	
35 or older	98 (17.3)	31 (14.4)	61 (14.8)	
Race and ethnicity				.008 [†]
White	61 (10.8)	19 (8.8)	43 (10.4)	
African American	333 (58.8)	128 (59.3)	193 (46.8)	
Hispanic	160 (28.3)	65 (30.1)	162 (39.3)	
Other	10 (1.8)	4 (1.9)	7 (1.7)	
Unknown	2 (0.4)	0 (0.0)	7 (1.7)	
Parity				.002 [*]
0	137 (24.2)	80 (37.0)	118 (28.6)	
1	155 (27.4)	55 (25.5)	135 (32.8)	
2	131 (23.1)	37 (17.1)	89 (21.6)	
3	77 (13.6)	24 (11.1)	33 (8.0)	
4 or more	66 (11.7)	19 (8.8)	35 (8.5)	
Unknown	0 (0.0)	1 (0.5)	2 (0.5)	
Timing of study enrollment				<.001 [*]
First or second trimester	167 (29.5)	80 (37.0)	139 (33.7)	
Third trimester	297 (52.5)	92 (42.6)	166 (40.3)	
Intrapartum or postpartum	102 (18.0)	44 (20.4)	107 (26.0)	
Maternal diabetes				.10 [*]
Yes	31 (5.5)	15 (6.9)	37 (9.0)	
No	535 (94.5)	201 (93.1)	375 (91.0)	
CD4+ count (cells/mm ³) closest to delivery				<.001 [*]
Less than 200	33 (5.8)	39 (18.1)	47 (11.4)	
200–499	269 (47.5)	81 (37.5)	174 (42.2)	
500 or greater	247 (43.6)	84 (38.9)	174 (42.2)	
Unknown	17 (3.0)	12 (5.6)	17 (4.1)	
Plasma viral load (copies/mL) closest to delivery				<.001 [*]
Less than 1,000	514 (90.8)	157 (72.7)	298 (72.3)	
1,000–9,999	18 (3.2)	24 (11.1)	65 (15.8)	
10,000 or greater	12 (2.1)	21 (9.7)	27 (6.6)	
Unknown	22 (3.9)	14 (6.5)	22 (5.3)	
Antiretroviral regimen closest to delivery				.36 [†]

Characteristic	Mode of Delivery			P
	Vaginal (n=566)	Nonelective Cesarean (n=216)	Elective Cesarean (n=412)	
Protease inhibitor-containing regimen	394 (69.6)	160 (74.1)	294 (71.4)	
Nonnucleoside reverse transcriptase inhibitor-containing regimen	69 (12.2)	20 (9.3)	36 (8.7)	
Nucleoside reverse transcriptase inhibitor-containing regimen	100 (17.7)	34 (15.7)	75 (18.2)	
No antiretrovirals	3 (0.5)	2 (0.9)	7 (1.7)	
Neonatal characteristics				
Gestational age (wk)				<.001* (For dichotomous variable)
Less than 37	81 (14.3)	66 (30.6)	55 (13.3)	
37 or greater	485 (85.7)	150 (69.4)	357 (86.7)	
37	87 (15.4)	41 (19.0)	91 (22.1)	
38	141 (24.9)	40 (18.5)	207 (50.2)	
39	138 (24.4)	33 (15.3)	37 (9.0)	
40	98 (17.3)	27 (12.5)	14 (3.4)	
Greater than 40	21 (3.7)	9 (4.2)	8 (1.9)	
Low birth weight				<.001*
Yes	60 (10.6)	46 (21.3)	49 (11.9)	
No	501 (88.5)	168 (77.8)	360 (87.4)	
Unknown	5 (0.9)	2 (0.9)	3 (0.7)	
Sex				.92*
Male	285 (50.4)	105 (48.6)	204 (49.5)	
Female	281 (49.6)	110 (50.9)	208 (50.5)	
Unknown	0 (0.0)	1 (0.5)	0 (0.0)	
HIV-1 infection status				1.00†
Infected	3 (0.5)	1 (0.5)	1 (0.2)	
Uninfected‡	537 (94.9)	198 (91.7)	384 (93.2)	
Indeterminate	26 (4.6)	17 (7.9)	27 (6.6)	

Data are n (%) unless otherwise specified.

* χ^2 test.

† Fisher exact test.

‡ Includes 119 presumptively uninfected patients.

Table 2

Association Between Mode of Delivery and Infant Respiratory Distress Syndrome and Transient Tachypnea of the Newborn

Respiratory Morbidities	Mode of Delivery			<i>P</i>
	Vaginal (n=566)	Nonelective Cesarean (n=216)	Elective Cesarean (n=412)	
Respiratory distress syndrome				<.001 [*]
Yes	9 (1.6)	16 (7.4)	18 (4.4)	
No	557 (98.4)	200 (92.6)	394 (95.6)	
Transient tachypnea of the newborn				.37 [†]
Yes	14 (2.5)	5 (2.3)	17 (4.1)	
No	552 (97.5)	211 (97.7)	395 (5.9)	

Data are n (%) unless otherwise specified.

^{*} χ^2 test.

[†] Fisher's exact test.

Table 3

Unadjusted and Adjusted Odds Ratios for Mode of Delivery and Respiratory Distress Syndrome

Covariate	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Adjusted <i>P</i>
Mode of delivery			.10
Elective cesarean	2.83 (1.26–6.36)	2.32 (0.95–5.67)	
Nonelective cesarean	4.95 (2.15–11.38)	2.56 (1.01–6.48)	
Vaginal	Reference	Reference	
Maternal race and ethnicity			.59
African American non-Hispanic	1.13 (0.39–3.33)	0.55 (0.17–1.80)	
Hispanic or other	0.98 (0.31–3.06)	0.55 (0.16–1.90)	
White, non-Hispanic	Reference	Reference	
Plasma viral load (copies/mL) closest to the delivery			.50
10,000 or greater	2.95 (1.10–7.91)	1.66 (0.53–5.25)	
1,000–9,999	2.27 (0.97–5.31)	1.62 (0.59–4.40)	
Less than 1,000	Reference	Reference	
Preterm birth			.002
Yes	11.71 (6.07–22.62)	3.65 (1.60–8.33)	
No	Reference	Reference	
Neonatal sex			.82
Male	1.06 (0.58–1.95)	1.08 (0.54–2.18)	
Female	Reference	Reference	
Low birth weight			<.001
Yes	14.90 (7.75–28.65)	7.20 (3.16–16.41)	
No	Reference	Reference	

OR, odds ratio; CI, confidence interval.