Human Immunodeficiency Virus in Pregnancy

Annie M. Dude, MD, PhD*, Maura Jones, MD, Tenisha Wilson, MD, PhD

KEYWORDS

• Human immunodeficiency virus • Pregnancy • Antiretroviral therapy
• Perinatal transmission

KEY POINTS

- All patients should be offered the opportunity for opt-out testing for human immunodeficiency virus (HIV) during pregnancy.
- Maternal antiretroviral therapy is key for optimizing maternal health and preventing perinatal transmission for patients living with HIV.
- With appropriate care during the prepregnancy, antepartum, intrapartum, and postpartum periods, the risk for perinatal transmission of HIV is less than 1%.

BACKGROUND

Human immunodeficiency virus (HIV) infection in pregnant people remains a public health concern in the United States as well as worldwide. An estimated 34,800 people in the United States received a diagnosis of HIV in 2019; of these, about 22% were in patients identified as female at birth.[1] Approximately 5000 people living with HIV give birth in the United States each year.[2]

Perinatal transmission of HIV can occur during the antepartum, intrapartum, and postpartum periods. The rate of perinatal transmission is between 15% and 45% when patients do not receive appropriate therapies during these periods, including antiretroviral therapy (ART), intrapartum prophylaxis (usually zidovudine), and neonatal prophylaxis.[3] This rate can be reduced to less than 1% with these and other measures.[4,5] Perinatal transmission in the United States and dependent areas has declined by more than 95% since the early 1990s.[6] Yet, perinatal transmission persists between 2011 and 2016, an estimated 99 cases of vertical transmission occurred in the United States.[7] These cases of perinatal transmission in the United States are usually associated with lack of timely diagnosis, lack of prenatal care, and/or lack of ART.

Division of Maternal-Fetal Medicine, Department of Obstetrics & Gynecology, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA
* Corresponding author. 3010 Old Clinic Building, Campus Box 7570, Chapel Hill, NC 27599.
E-mail address: annie_dude@med.unc.edu

Obstet Gynecol Clin N Am 50 (2023) 389–399
https://doi.org/10.1016/j.ogc.2023.02.010 **obgyn.theclinics.com**
0889-8545/23/© 2023 Elsevier Inc. All rights reserved.

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

HIV infection also poses health risks to pregnant patients, including increased risk of opportunistic infections, as CD4 T-lymphocyte counts fall during pregnancy,[8] increased risk of gestational diabetes (as impaired glucose metabolism is associated with certain protease inhibitors),[9] and increased risk of obstetric severe maternal morbidity and mortality.[10,11] These risks can be alleviated with ART and other measures.

The goal of this document is to describe how to screen for HIV in pregnancy, how to optimize care for patients living with HIV, and how to reduce the risk of perinatal transmission during the prepregnancy, antepartum, intrapartum, and postpartum periods.

DISCUSSION

Human Immunodeficiency Virus Testing in Pregnancy

The Centers for Disease Control and Prevention (CDC), the United States Preventative Services Task Force, and the American College of Obstetricians and Gynecologists (ACOG) all recommend universal, opt-out testing for HIV at least one time during pregnancy, ideally in the first trimester or at the first prenatal care visit.[12–14] "Opt-out" indicates that patients should be informed that an HIV test is part of routine obstetric care and that they will be tested unless they specifically decline the test.[14] Studies show this method results in higher percentages of patients being tested for HIV than "opt-in" testing, where patients are tested only if they specifically give verbal or written consent.[15] ACOG also recommends repeat third trimester testing for patients who are at high risk of HIV transmission based on local prevalence or patient symptoms consistent with acute HIV infection, such as fever, lymphadenopathy, myalgias, and others.[12] Third trimester HIV testing is also required by law in several states.[16] Finally, for patients who were not tested during routine prenatal care or for whom HIV status is otherwise unknown, ACOG recommends rapid testing when presenting for delivery or immediately postpartum using an opt-out approach.[12] When a person's HIV status remains unknown following delivery, testing of the newborn is recommended.[14]

Initial screening tests indicating an HIV infection use antigen/antibody testing. The CDC currently recommends a "fourth generation" test with both antibodies (IgG and IgM) as well as the p24 antigen. These fourth-generation tests allow for earlier detection (within 10 days of infection) than earlier iterations of antibody-only tests, have 99% sensitivity, and have 99% specificity as well.[17] These tests must be confirmed with antibody differentiation assays that distinguish between HIV-1 and HIV-2. If patients test negative or indeterminate for both HIV-1 and HIV-2 with these differentiation assays, confirmation with a nucleic acid test is recommended.[18] See **Fig. 1** for the current CDC testing algorithm.

Prepregnancy Care for Patients Living with Human Immunodeficiency Virus

Before pregnancy, there are a number of actions patients and clinicians can undertake to improve a pregnant person's health during pregnancy, decrease the chances of perinatal transmission, and decrease the chances of transmission to an uninfected partner. Foundational to improving health for the potentially pregnant person and to avoid transmission is treatment with ART to achieve an undetectable viral load, which greatly reduces the risk of either sexual transmission while attempting conception or perinatal transmission.[19] Although beyond the scope of this document, all patients living with HIV who have a serodiscordant partner (ie, a partner that is HIV-negative) should discuss the possibility of pre-exposure prophylaxis, or PreP. In brief, PreP in the context of pregnancy consists of antiretrovirals taken by HIV seronegative sexual

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

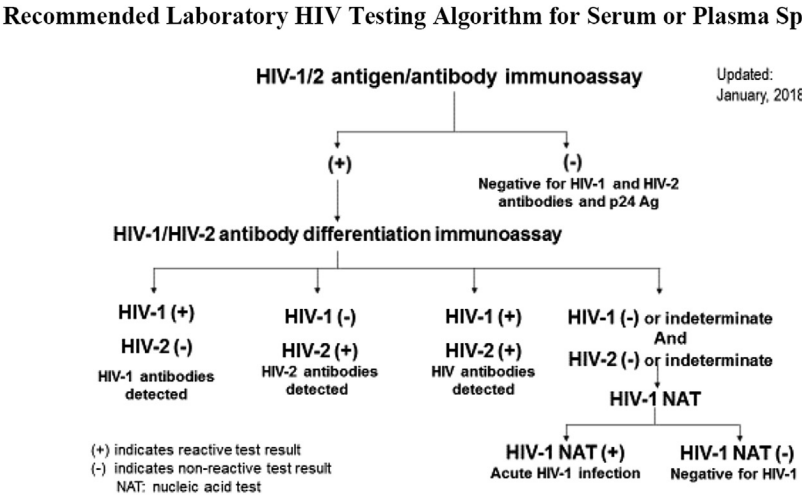


Fig. 1. CDC testing algorithm for HIV in pregnancy. (*From* Centers for Disease Control and Prevention (CDC). 2018 Quick reference guide: Recommended laboratory HIV testing algorithm for serum or plasma specimens. Published June 2014, updated January 2018. Available at https://stacks.cdc.gov/view/cdc/50872 and https://www.cdc.gov/hiv/pdf/guidelines_testing_recommendedlabtestingalgorithm.pdf.)

partners of patients living with HIV while having condomless intercourse with the goal of becoming pregnant. If patients living with HIV have an undetectable viral load, it is unclear whether there is an additional benefit in terms of risk reduction for their partners to take PreP.[20]

Several prepregnancy vaccinations are recommended: for those with CD4 counts greater than 200 cells per cubic millimeter, varicella and rubella should be given if patients are not already immune. All patients living with HIV should be vaccinated against influenza, pneumococcus, the human papilloma virus, hepatitis B, hepatitis A, severe acute respiratory syndrome coronavirus 2, and Tdap.[21]

In the prepregnancy period and throughout pregnancy, patients with CD4 T-lymphocyte counts below certain thresholds may need to be initiated on prophylactic medications to protect against opportunistic infections. A list of these infections and prophylactic medications can be found in **Table 1**.

Antepartum Care for Patients Living with Human Immunodeficiency Virus

Pregnant persons should begin ART as early as possible to improve their health outcomes, regardless of CD4 counts or viral load. In general, if a person who becomes pregnant is on a regimen with a sustained undetectable viral load, that regimen should be continued. The same regimens that are recommended for the treatment of nonpregnant adults should be used in pregnant adults. Important considerations in selecting a regimen include the risks and benefits of the medications for each person who becomes pregnant, previous experience with ART regimens, compliance, and pill aversions. For persons who become pregnant and are not on ART, initiation is recommended as soon as possible after HIV infection is diagnosed.

There are several considerations regarding ART use specific to pregnancy. For people with nausea and vomiting of pregnancy, proactive treatment with antiemetics is recommended. The increased volume of distribution and glomerular filtration rate

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

Table 1
Prophylaxis for common opportunistic infections in patients living with human immunodeficiency virus

CD4 Count	Notes	Opportunistic Infection	Prophylactic Medication
<200	CD4 < 200 OR CD < 14%	*Pneumocystis jirovecii* Pneumonia	TMP-SMX 1 tablet double strength by mouth daily
<150	Occupational exposures or live in a community with a high endemic rate (>10 cases histoplasma/100 patient y)	Histoplasma	Itraconazole 200 mg by mouth daily
<100		*Toxoplasma gondii*	TMX-SMX one tablet double strength by mouth daily
<50	Not recommended with immediate initiation of ART to avoid immune reconstitution	MAC Mycobacterium avium complex disease	Azithromycin 1200 mg by mouth once weekly Or clarithromycin 500 mg by mouth twice per d Or Azithromycin 600 mg by mouth twice weekly

changes medication pharmacokinetics, and several drugs may have subtherapeutic levels in the third trimester. In patients who have a viral load greater than 500 copies/mL, ART drug resistance genotype evaluation should be performed to ensure optimal ART selection before starting ART or modifying regimens. However, ART initiation should not be delayed before genotype results are available.

There are a number of laboratory tests that should be ordered in addition to standard prenatal laboratories for patients living with HIV and on ART. A list of these laboratories can be found in **Table 2**.

In terms of prenatal diagnosis, pregnant people living with HIV should be offered genetic counseling, including options of noninvasive and invasive testing. Recent studies indicate that for pregnant persons on ART with a sustained undetectable viral load, HIV transmission rates with chorionic villus sampling and amniocentesis are not increased from baseline.[22] Patients living with HIV do not have a higher risk of birth defects than the general population, even when on ART.[23–25] People living with HIV should be offered routine first and second trimester anatomy scans as any other pregnant person, and diagnostic testing should not be withheld.

Intrapartum Care for Patients Living with Human Immunodeficiency Virus

Pregnant patients with HIV should have viral loads reassessed between 34 to 36 weeks in anticipation of delivery to guide recommendations and management. Patients should be counseled regarding mode of delivery based on the results of this test.

Management in Those with Viral Loads Greater than 1000 Copies/mL

Patients with unknown viral loads or viral loads greater than 1000 should be counseled on the benefits of cesarean delivery on the risk of vertical transmission. A 1999 randomized controlled trial by the European Mode of Delivery Collaboration demonstrated a vertical transmission rate of 2% for those undergoing scheduled cesarean

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

Table 2
Laboratory tests in the context of human immunodeficiency virus

	Time Period					
Laboratory test	**Before Pregnancy**	**On Entry to Prenatal Care**	**Every Trimester**	**Every Month**	**34–36 wk**	**Other**
HIV viral load	X	X	X	X[c]	X	
CD4 T-lymphocyte count	X	X		X[d]		
Complete blood count	X	X	X			
Liver and kidney function tests	X	X	X			
Antiretroviral drug resistance (genotype) panel	X					
G6PD[a] and HLA-B*5701[b]	X					
Toxoplasmosis IgG	X					
Hepatitis A, B, and C screening		X				
Sexually transmitted infection screening		X				
Tuberculosis screening	X					

[a] If positive, do not use abacavir for ART.
[b] If G6PD deficiency is present, then avoid trimethoprim/sulfamethoxazole for *Pneumocystis jirovecii* prophylaxis.
[c] If viral RNA remains detectable, then check viral loads every month.
[d] For individuals who have been on ART less than 2 y, individuals with CD4 counts lower than 300 cells/mm^3, individuals with detectable viral loads, and in individuals who have inconsistent adherence to ART.

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

section compared with a rate of 10% for those undergoing other modes of delivery.[26] Given this, the benefit of scheduling a cesarean delivery at 38 weeks or otherwise before the onset of labor or rupture of membranes should be included in counseling and offered. For those undergoing scheduled cesarean, intravenous zidovudine should be administered at least 3 hours before the scheduled cesarean delivery.[27]

For those who present in labor or with rupture of membranes (before cesarean), zidovudine should be initiated on presentation. The Mothers' and Infants' Cohort Study examined that the relationship between rupture of membranes and vertical transmission of HIV and found that rupture for $\geq$ 4 hours was associated with a significantly higher rate of transmission, regardless of the duration of labor or mode of delivery.[28] A 2001 meta-analysis by the International Perinatal HIV Group looked at over 4000 deliveries with rupture of membranes for $\leq$ 24 hours and found the risk of vertical transmission increased approximately 2% per hour in those with HIV and even more so in those with AIDS.[29] Therefore, the delivery plan should be individualized, as the benefit of a cesarean in reducing the risk of perinatal transmission may not persist if membranes have been ruptured for a significant length of time.

Management in Those with Viral Loads Less than 1000 Copies/mL

In those with viral loads less than 1000 on ART, the risk of transmission is low, regardless of the mode of delivery or duration of membrane rupture. Therefore, cesarean is not routinely recommended in this population and should be reserved for the standard obstetric indications, with delivery timing according to the obstetric indication.[27,30] Briand and colleagues reviewed the mode of delivery from 2000 to 2010 in those on ART with viral load thresholds at 50, 400, and 1000 copies/mL and found no difference in transmission according to the mode of delivery between the different cutoffs.[31] In addition, when considering delivery timing in this population, Scott and colleagues found that elective delivery before 40 weeks was not found to decrease the risk of transmission, so delivery timing should be based on standard obstetrics indications.[32]

The use of zidovudine in this population is varied with experts positing that in those receiving and compliant to ART and viral loads less than 50 copies/mL, it can be deferred. In Myer and colleagues, the risk of transmission in those on ART with viral loads of 50 to 1000 copies/mL had a 2% risk of transmission, compared 0.25% in those with viral loads less than 50 copies/mL.[33] Given concern there is a slightly increased risk of transmission in those with viral loads between 50 and 1000 copies/mL, some experts recommend intrapartum zidovudine despite a viral load less than 1000 copies/mL. The use of intrapartum zidovudine should be individualized based on antiretroviral compliance, in discussion with the patient considering their preferences.

Other Intrapartum Considerations

There are other processes that should be followed for all patients with HIV in labor, regardless of viral load or zidovudine prophylaxis. These include:

- Avoiding fetal scalp electrodes or internal fetal monitors as much as possible
- Continuing ART throughout labor
- Avoiding the use of methergine or other ergotamines in patients taking protease inhibitors or cobicistat to avoid excessive vasoconstriction
- Avoid operative vaginal delivery if possible, particularly if viral load is greater than 50 copies/mL
- Avoid artificial rupture of membranes if possible, particularly if viral load is greater than 50 copies/mL

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

Postpartum Care and Follow-Up for Patients Living with Human Immunodeficiency Virus

Based on data obtained from randomized controlled trials, regardless of CD4 count or clinical status, continuation of ART in the postpartum setting is recommended to reduce the risk of disease progression and HIV transmission.[34–36] If pregnancy-related factors, such as toxicity concerns, resulted in regimen selection in the antepartum setting that contains agents that are not preferred in nonpregnant patients, modification in the regimen may need to be made after delivery.

Given the stressors of caring for a newborn, it has been shown that adherence to ART is especially challenging in the postpartum setting,[37] which underscores the importance of adherence counseling and ensuring appropriate support before discharge from the hospital.

Breastfeeding Recommendations

Breastfeeding is not recommended in the United States or any resource-rich countries.[38] In the antepartum setting, patients should be counseled as such, even in cases of complete adherence to ART and objective evidence of viral suppression. This recommendation is based on trials in resource-limited settings demonstrating that although ART and viral suppression significantly reduce the risk of HIV transmission, they do not completely eliminate it.[39] Given the accessibility, affordability, and safety of infant formula in the United States, the risk of viral transmission with breastfeeding outweighs the known benefits of breastfeeding and is therefore not recommended. Patients should be counseled about means of lactation suppression, including wearing tight-fitting sports bras, hot and cold compresses, and pain relief from ibuprofen or acetaminophen.

Patients may, however, decide to breastfeed for a whole host of social, cultural, and personal reasons. For patients who choose to breastfeed despite the CDC recommendations, providers should counsel patients about measures to help prevent viral transmission, including continuation of ART and infant prophylaxis.[40] All infants born to mothers with HIV should receive 4 to 6 weeks of postexposure prophylaxis. Whether this duration should be extended in breastfed infants depends on maternal viral load and ART adherence. In mothers with an undetectable viral load and consistent adherence to ART, there does not seem to be a benefit to continuing infant prophylaxis for the duration of breastfeeding.[41] However, for infants of mothers who are not virally suppressed, daily prophylaxis with nevirapine until at least 1 week after weaning is recommended, as it has been shown to prevent viral transmission.[41] Regardless of the regimen and the duration of prophylaxis, it is recommended that breastfed infants should be monitored for HIV acquisition every 3 months during breastfeeding and 4 to 6 weeks, 3 months, and 6 months following the cessation of breastfeeding.

Neonatal Management

It is recommended that all infants at high risk of vertical transmission receive combination antiretroviral postexposure prophylaxis. Those who were diagnosed with acute or primary HIV during pregnancy or lactation, did not receive ART during pregnancy, those who received only intrapartum ART, or received ART, but did not achieve viral suppression (defined as HIV viral ribonucleic acid [RNA] levels of < 50 copies/mL) at least 4 weeks before delivery are considered at high risk of vertical transmission. The recommended regimen is effectively presumptive HIV treatment and includes a 6-week course of three drugs: zidovudine, lamivudine, and either treatment dose nevirapine

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

or raltegravir. If there is concern for HIV-2, the raltegravir regimen should be used as nevirapine is ineffective against HIV-2. If zidovudine toxicity develops, abacavir can be used as an alternative. Of note, if the infant is diagnosed with HIV infection, this regimen should be continued indefinitely.

In contrast, it is recommended that infants at low risk of vertical HIV acquisition (mothers who are adherent to ART and achieve viral suppression at least 4 weeks before delivery) receive a single-drug regimen of zidovudine postexposure prophylaxis after birth for 4 to 6 weeks. All postexposure prophylaxis regimens should be initiated as soon as possible, within 6 to 12 hours of birth.

Postpartum Contraception

Patients living with HIV should be counseled regarding contraception options in light of potential drug–drug interactions between certain methods and antiretroviral drugs that may reduce the efficacy of the contraceptive method, the antiretroviral drug, or both. We recommend consulting with a pharmacist familiar with antiretroviral medications before prescribing oral contraceptive pills, using injectable contraception, or using progesterone-releasing implants.

Further Resources

For those with remaining questions or for advice about specific scenarios, the National Perinatal HIV Hotline (1–888–448–8765) provides free consultations to anyone caring for pregnant patients with HIV. Clinicians can also reference the "Recommendations for the Use of Antiretroviral Drugs During Pregnancy and Interventions to Reduce Perinatal HIV Transmission in the United States" from the US Department of Health and Human Services, available online and updated regularly.[42] Finally, clinicians can consult the National Clinician Consultation Center at the University of California San Francisco: https://nccc.ucsf.edu. Finally, the Society for Maternal-Fetal Medicine has checklists available to ensure complete care for patients living with HIV.[43]

SUMMARY

All pregnant people should be offered opt-out HIV testing at least once during pregnancy. Treatment with ART, as well as intrapartum measures and neonatal prophylaxis, can reduce the risk of perinatal HIV transmission to less than 1%.

CLINICS CARE POINTS

- All pregnant patients should be offered opt-out human immunodeficiency virus (HIV) testing during pregnancy.
- Patients of reproductive age living with HIV should be asked about their reproductive intentions.
- Patients living with HIV who have serodiscordant partners should be counseled about the use of pre-exposure prophylaxis in the setting of attempting conception.
- All patients, including those who are pregnant, who are living with HIV should be started on antiretroviral therapy regardless of viral load or symptoms.
- Pregnant patients with an HIV RNA viral load less than 1000 copies/mL should only have a cesarean delivery for obstetric indications.
- Pregnant patients with an HIV RNA viral load $\leq$ 1000 copies/mL should be counseled that a prelabor/pre-rupture of membranes should be counseled that a cesarean may reduce the risk of perinatal transmission.

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

- Intravenous zidovudine prophylaxis at the time of delivery will help reduce the risk of perinatal transmission for most patients.
- Patients living with HIV in high-resource settings should be counseled about the Centers for Disease Control and Prevention recommendation to avoid breastfeeding.
- Neonatal prophylaxis with antiretroviral therapy will help reduce perinatal transmission.
- Multiple hotlines and clinical resources exist to help tailor recommendations to specific clinical scenarios.

CONFLICT OF INTEREST

The author reports no conflicts of interest.

REFERENCES

1. Centers for Disease Control and Prevention. Estimated HIV incidence and prevalence in the United States, 2015 - 2019. HIV surveillance supplemental report 2021; 26(No. 1). 2021. Available at: http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html. Accessed November 15, 2022.
2. Nesheim SR, FitzHarris LF, Lampe MA, et al. Reconsidering the number of women with HIV infection who give birth annually in the United States. Public Health Rep 2018;133(6):637–43.
3. Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. N Engl J Med 1994;331(18):1173–80.
4. Dorenbaum A, Cunningham CK, Gelber RD, et al. Two-dose intrapartum/newborn nevirapine and standard antiretroviral therapy to reduce perinatal HIV transmission: a randomized trial. JAMA 2002;288(2):189–98.
5. Fowler MG, Qin M, Fiscus SA, et al. Benefits and Risks of Antiretroviral Therapy for Perinatal HIV Prevention. N Engl J Med 2016;375(18):1726–37.
6. Centers for Disease Control and Prevention. HIV surveillance report. 2018. 31. Available at: https://www.cdc.gov/hiv/library/reports/hiv-surveillance/vol-31/content/children.html. Accessed November 15, 2022.
7. Centers for Disease Control and Prevention. HIV surveillance report. 2016. 28. Available at: http://www.cdc.gov/hiv/library/reports/hiv-surveillance/html. Accessed November 15, 2022.
8. Tuomala RE, Kalish LA, Zorilla C, et al. Changes in total, CD4+, and CD8+ lymphocytes during pregnancy and 1 year postpartum in human immunodeficiency virus-infected women. The Women and Infants Transmission Study. Obstet Gynecol 1997;89(6):967–74.
9. Tang JH, Sheffield JS, Grimes J, et al. Effect of protease inhibitor therapy on glucose intolerance in pregnancy. Obstet Gynecol 2006;107(5):1115–9.
10. Lathrop E, Jamieson DJ, Danel I. HIV and maternal mortality. Int J Gynaecol Obstet 2014;127(2):213–5.
11. Wedi CO, Kirtley S, Hopewell S, et al. Perinatal outcomes associated with maternal HIV infection: a systematic review and meta-analysis. Lancet HIV 2016;3(1):e33–48.
12. Pollock L, Cohan D, Pecci CC, et al, ACOG Committee Opinion No. 752. Prenatal and perinatal human immunodeficiency virus testing. Obstet Gynecol 2019;133(1):187.

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

13. US Preventative Services Task Force, Owens DK, Davidson KW, Krist AH, et al. Screening for HIV Infection: US Preventive Services Task Force Recommendation Statement. JAMA 2019;321(23):2326–36.
14. Branson BM, Handsfield HH, Lampe MA, et al. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. MMWR Recomm Rep 2006;55(RR-14):1–17.
15. Centers for Disease Control and Prevention. HIV testing among pregnant women–United States and Canada, 1998-2001. MMWR Morb Mortal Wkly Rep 2002;51(45):1013–6.
16. Cassimatis IR, Ayala LD, Miller ES, et al. Third-trimester repeat HIV testing: it is time we make it universal. Am J Obstet Gynecol 2021;225(5):494–9.
17. Nasrullah M, Wesolowski LG, Meyer WA 3rd, et al. Performance of a fourth-generation HIV screening assay and an alternative HIV diagnostic testing algorithm. AIDS 2013;27(5):731–7.
18. National Center for HIV/AIDS VH, and TB Prevention (U.S.). Division of HIV/AIDS Prevention, Association of Public Health Laboratories. Quick reference guide: recommended laboratory HIV testing algorithm for serum or plasma specimens. 2018. Centers for Disease Control and Prevention, Atlanta, GA.
19. Eisinger RW, Dieffenbach CW, Fauci AS. HIV viral load and transmissibility of HIV infection: undetectable equals untransmittable. JAMA 2019;321(5):451–2.
20. Centers for Disease Control and Prevention. HIV Treatment as Prevention. Available at: https://www.cdc.gov/hiv/risk/art/index.html. Accessed November 15, 2022.
21. Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/vaccines/adults/rec-vac/health-conditions/hiv.html. Accessed November 15, 2022.
22. Floridia M, Masuelli G, Meloni A, et al. Amniocentesis and chorionic villus sampling in HIV-infected pregnant women: a multicentre case series. BJOG 2017;124(8):1218–23.
23. Wang L, Kourtis AP, Ellington S, et al. Safety of tenofovir during pregnancy for the mother and fetus: a systematic review. Clin Infect Dis 2013;57(12):1773–81.
24. Rasi V, Cortina-Borja M, Peters H, et al. Brief Report: surveillance of congenital anomalies after exposure to raltegravir or elvitegravir during pregnancy in the United Kingdom and Ireland, 2008-2018. J Acquir Immune Defic Syndr 2019;80(3):264–8.
25. Floridia M, Mastroiacovo P, Tamburrini E, et al. Birth defects in a national cohort of pregnant women with HIV infection in Italy, 2001-2011. BJOG 2013;120(12):1466–75.
26. European Mode of Delivery Collaboration. Elective caesarean-section versus vaginal delivery in prevention of vertical HIV-1 transmission: a randomised clinical trial. Lancet 1999;353(9158):1035–9.
27. ACOG Committee Opinion No. 751 Summary: labor and delivery management of women with human immunodeficiency virus infection. Obstet Gynecol 2018;132(3):803–4.
28. Minkoff H, Burns DN, Landesman S, et al. The relationship of the duration of ruptured membranes to vertical transmission of human immunodeficiency virus. Am J Obstet Gynecol 1995;173(2):585–9.
29. International Perinatal HIV Group. Duration of ruptured membranes and vertical transmission of HIV-1: a meta-analysis from 15 prospective cohort studies. AIDS 2001;15(3):357–68.

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.

30. Townsend CL, Cortina-Borja M, Peckham CS, et al. Low rates of mother-to-child transmission of HIV following effective pregnancy interventions in the United Kingdom and Ireland, 2000-2006. AIDS 2008;22(8):973–81.
31. Briand N, Jasseron C, Sibiude J, et al. Cesarean section for HIV-infected women in the combination antiretroviral therapies era, 2000-2010. Am J Obstet Gynecol 2013;209(4):335 e331–e335 e312.
32. Scott RK, Chakhtoura N, Burke MM, et al. Delivery after 40 weeks of gestation in pregnant women with well-controlled human immunodeficiency virus. Obstet Gynecol 2017;130(3):502–10.
33. Myer L, Phillips TK, McIntyre JA, et al. HIV viraemia and mother-to-child transmission risk after antiretroviral therapy initiation in pregnancy in Cape Town, South Africa. HIV Med 2017;18(2):80–8.
34. Group ISS, Lundgren JD, Babiker AG, et al. Initiation of antiretroviral therapy in early asymptomatic HIV infection. N Engl J Med 2015;373(9):795–807.
35. Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. N Engl J Med 2011;365(6):493–505.
36. Grinsztejn B, Hosseinipour MC, Ribaudo HJ, et al. Effects of early versus delayed initiation of antiretroviral treatment on clinical outcomes of HIV-1 infection: results from the phase 3 HPTN 052 randomised controlled trial. Lancet Infect Dis 2014;14(4):281–90.
37. Nachega JB, Uthman OA, Anderson J, et al. Adherence to antiretroviral therapy during and after pregnancy in low-income, middle-income, and high-income countries: a systematic review and meta-analysis. AIDS 2012;26(16):2039–52.
38. Centers for Disease Control and Prevention. HIV and perinatal transmission: preventing perinatal HIV transmission. Available at: https://www.cdc.gov/hiv/group/pregnant-people/transmission.html. Accessed November 15, 2022.
39. Flynn PM, Taha TE, Cababasay M, et al. Association of maternal viral load and CD4 count with perinatal HIV-1 transmission risk during breastfeeding in the PROMISE postpartum component. J Acquir Immune Defic Syndr 2021;88(2):206–13.
40. Levison J, Weber S, Cohan D. Breastfeeding and HIV-infected women in the United States: harm reduction counseling strategies. Clin Infect Dis 2014;59(2):304–9.
41. Coovadia HM, Brown ER, Fowler MG, et al. Efficacy and safety of an extended nevirapine regimen in infant children of breastfeeding mothers with HIV-1 infection for prevention of postnatal HIV-1 transmission (HPTN 046): a randomised, double-blind, placebo-controlled trial. Lancet 2012;379(9812):221–8.
42. Panel on Treatment of HIV During Pregnancy and Prevention of Perinatal Transmission. Recommendations for the use of antirertoviral drugs during pregnancy and interventions to reduce perinatal HIV transmission in the United States. Department of Health and Human Services. Available at: https://clinicalinfo.hiv.gov/en/guidelines/perinatal. Accessed November 15, 2022.
43. Patient Safety and Quality Committee, Society for Maternal-Fetal Medicine, Gibson KS, Toner LE. Society for Maternal-Fetal Medicine Special Statement: Updated checklists for pregnancy management in persons with HIV. Am J Obstet Gynecol 2020;223(5):B6–11.

Descargado para Anonymous User (n/a) en National Library of Health and Social Security de ClinicalKey.es por Elsevier en junio 06, 2023. Para uso personal exclusivamente. No se permiten otros usos sin autorización. Copyright ©2023. Elsevier Inc. Todos los derechos reservados.