THE SAFER MOTHERHOOD
Knowledge Transfer Program

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PREVENTION OF HIV TRANSMISSION

Guidelines

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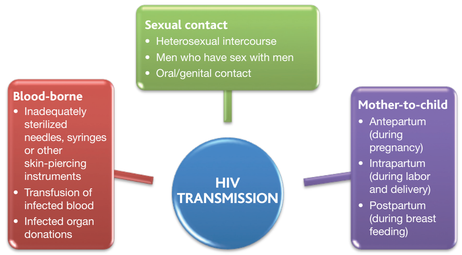
1 HIV Basics

Human immunodeficiency virus (HIV) is a virus that kills the body's CD4 cells (or T helper cells). CD4 cells are a subset of white blood cells that assist in the immune response to pathogens.

Bodily fluids that carry HIV
- Blood
- Semen and pre-seminal fluid
- Vaginal secretions
- Breast milk
- Amniotic fluid
- Other bodily fluids: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid

HIV enters the body by crossing
- Broken skin
- Needles (entering the blood stream)
- Lining of the anus or rectum
- Lining of the vagina or cervix
- Opening of the penis
- Surface of lips and mouth with open sores

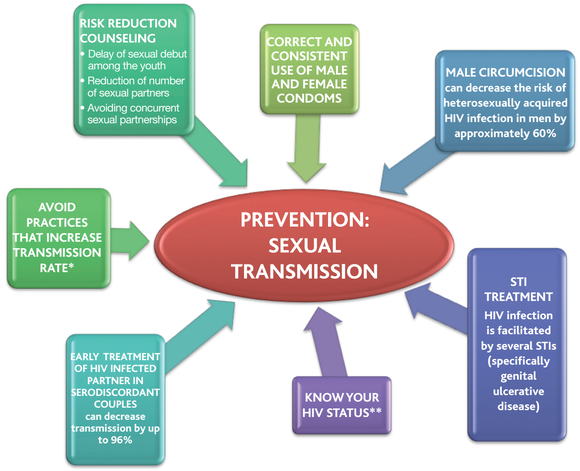
HIV transmission occurs when fluids containing HIV from an infected person enter the body of an uninfected person.



*Individuals cannot become infected through ordinary day to day contact such as hugging, kissing, shaking hands, or sharing food, water and personal objects.

2 Prevention: Sexual Transmission

The risk of transmission can be significantly reduced in the following ways:



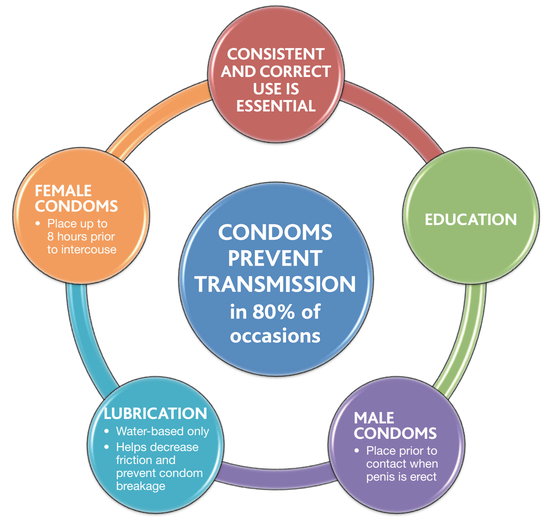
*Oil based lubricants damage condoms, making them less effective; nonoxynol 9 irritates rectal and vaginal walls; douching (anal or vaginal) irritates mucous lining; 'dry' sex; avoid intercourse when there are ulcerative genital lesions present or after any procedure on the cervix (LEEP or cone) or after male circumcision until healed

**When performed concurrently with counseling, HIV testing provides education on prevention. Early diagnosis of disease enables access to treatment and care. Studies show that people who are aware of positive HIV status are more likely to engage in safer sexual practices. Initiating ART (antiretroviral therapy) will decrease HIV viral load, which decreases the likelihood of transmission to others.

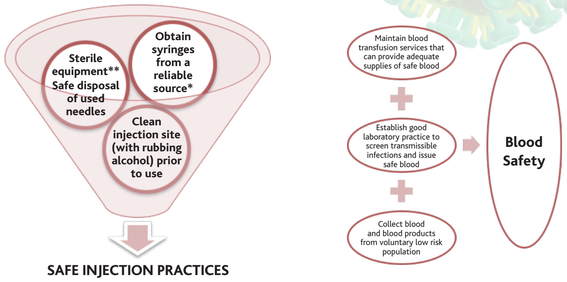
3 Prevention: Sexual Transmission

Proper use of condoms has been shown to decrease the transmission rate of HIV by approximately 80% for vaginal intercourse and 64% for anal intercourse.

Common obstacles to condom usage include poor acceptability, lack of control over use (people may lack negotiating skills), desire for procreation, and in certain areas condoms may not be available. Clinics should have condoms readily available along with accessible counseling on proper condom usage and negotiating skills.



4 Prevention: Blood-Borne Transmission



SAFE INJECTION PRACTICES

Provide education regarding safe injection practices for intravenous drug users along with rehabilitation information

*Includes pharmacies or needle exchange programs
**Use only sterile water; containers or cookers must be disinfected; use a new filter or cotton when preparing drugs

Postexposure prophylaxis

OCCUPATIONAL EXPOSURE

- **Definition:** any percutaneous injury (needle stick or cut with a sharp object) or contact of a mucous membrane or non-intact skin with blood, tissue, or other bodily fluids which are potentially infected (cerebral spinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid or amniotic fluid, semen or vaginal secreitons)

NON-OCCUPATIONAL EXPOSURE

- **Definition:** exposure of vagina, rectum, eye, mouth or other mucous membrane, non-intact skin or percutaneous contact with blood, semen, vaginal secretions, rectal secretions, breast milk or any bodily fluid that is visibly contaminated with blood

PROPHYLAXIS

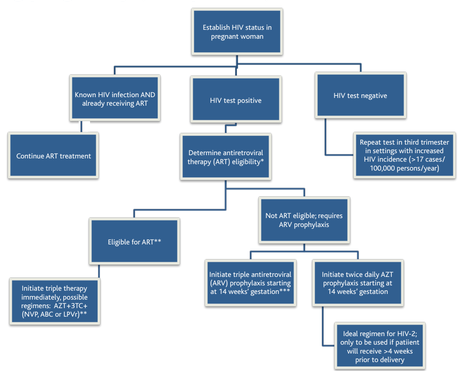
- Must be initiated within 72 hours of exposure
- HIV test should be performed after exposure, and at 3 and 6 months
- 28 day course of HAART (Highly Active Anti Retroviral Therapy) recommended

5 Prevention: Mother to Child Transmission (MCT)

ANTEPARTUM

All pregnant women should be encouraged to seek and utilize antenatal care if available. All pregnant women should be tested for HIV at their initial OB visit. Vertical transmission rates vary from 16 to 25% among mothers who do not receive ARV prophylaxis. This can be decreased to 1–2% when mothers are treated with HAART.

During pregnancy (antepartum)



Patients should be tested for TB at new obstetrics visit
*Patients should be started on chronic treatment while awaiting eligibility determination. CD4 count ≤350, or WHO clinical stage 3–4 requires treatment.
**NVP should not be used if patient Hep B positive or in mothers with CD4 count >250 cells/mm³
***Triple ARV prophylaxis should not include NNRTI

6 Prevention: Mother to Child Transmission

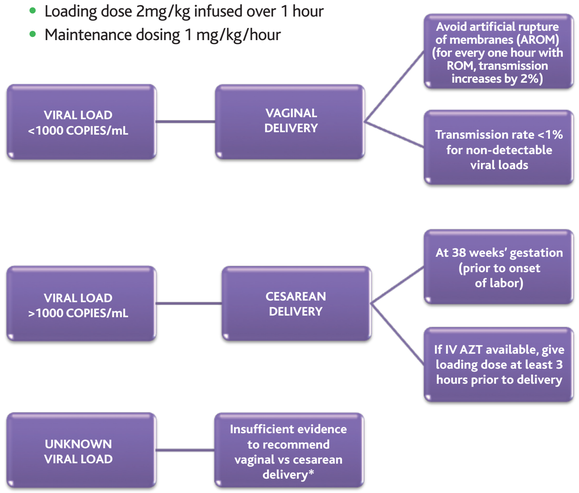
INTRAPARTUM

Treatment during labor (intrapartum)

All pregnant women should be encouraged to undergo a facility-based delivery with a skilled birth attendant to ensure safe delivery techniques (vaginal or cesarean delivery).

Mothers should continue their antiretroviral (ARV) medication throughout labor. When available, intravenous AZT should be given in addition to ARV medication:

- Loading dose 2mg/kg infused over 1 hour
- Maintenance dosing 1 mg/kg/hour



*Decide based on clinical judgment, taking into consideration safety of facilities available for safe cesarean delivery, including maternal and infant morbidity/mortality.

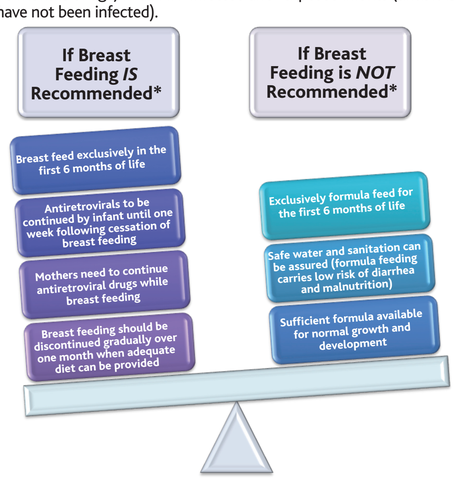
7 Prevention: Mother to Child Transmission

POSTPARTUM

Treatment after delivery (postpartum)

Infants born to mothers who are HIV positive should receive NVP during the first week of life along with 6 weeks of AZT for postexposure prophylaxis.

Consider infant clotrimoxazole prophylaxis (e.g. 20 mg TMP/100 mg SMZ in infants under 6 months of age) in all HIV-infected and -exposed infants (until it is clear they have not been infected).



*National or sub-national authorities should make official recommendations regarding breast feeding in HIV positive mothers that should reflect the greatest likelihood of HIV-free survival of children without harming the health of the mother. All mothers must have sufficient access to health care that offers comprehensive child health services.

Access to family planning education and interventions is essential in the overall control of HIV transmission.

PREVENTION OF HIV TRANSMISSION – GUIDELINES

1 HIV Basics

Stage	Guidelines
Before Initiating PrEP	**Determine Eligibility** • Document negative HIV antibody test(s) immediately before starting PrEP medication • Test for acute infection if patient has symptoms consistent with acute HIV infection • Confirm that patient is a substantial, ongoing, high risk for acquiring HIV infection • Confirm that calculated creatinine clearance is >60 mL/minute (via Cockcroft-Gault formula) **Other Recommended Actions** • Screen for hepatitis B infection; vaccinate against hepatitis B if susceptible, or treat if active infection exists, regardless of decision about prescribing PrEP • Screen and treat as needed for STI
Beginning PrEP medication regimen	• Truvada (TDF [300 mg] plus FTC [200 mg]) 1 tablet daily • Provide no more than a 90 day supply, renewable only after HIV testing confirms that patient remains HIV-uninfected • If active hepatitis B infection is diagnosed, consider using TDF/FTC for both treatment of active hepatitis B infection and HIV prevention • Provide risk-reduction and PrEP medication adherence counseling and condoms
Follow-up while PrEP medication is being taken	• Every 2–3 months, perform HIV antibody test; document negative result • Evaluate and support PrEP medication adherence at each follow-up visit, more often if inconsistent adherence is identified • Every 2–3 months, assess risk behaviors and provide risk-reduction counseling and condoms. Assess STI symptoms and, if present, test and treat for STI as needed • Every 6 months, test for STI even if patient is asymptomatic, and treat as needed • 3 months after initiation, then yearly while on PrEP medication, check blood urea nitrogen and serum creatinine
On discontinuing PrEP (at patient request, for safety concerns, or if HIV infection is acquired)	• Perform HIV test(s) to confirm whether infection has occurred • If HIV positive, order and document results of resistance testing and establish linkage to HIV care • If HIV negative, establish linkage to risk-reduction support services as indicated • If active Hepatitis B is diagnosed at initiation of PrEP, consider appropriate medication for continued treatment of hepatitis B

Table 1: Guidelines for pre-exposure prophylaxis (PrEP)

Human immunodeficiency virus (HIV) is a virus that kills the body's CD4 cells (or T helper cells)[1]. Transmission occurs when fluids containing the virus from an infected person enter the body of an uninfected person. Bodily fluids that carry the virus include blood, semen and pre-seminal fluid, vaginal fluid and breast milk[2]. Other bodily fluids which are potentially infected include cerebrospinal fluid (CSF), synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid and amniotic fluid[3]. Vectors in which HIV enters the body include the lining of the anus, rectum, vagina or cervix, the opening of the penis, broken skin, bleeding gums, open sores within the mouth and needles which enter the blood stream.

Modes of transmission include sexual contact, blood-borne transmission and maternal-to-child vertical transmission. Sexual contact includes performing or receiving oral sex, and anal or vaginal intercourse[2]. Blood-borne transmission occurs primarily through inadequately sterilized needles, syringes or other skin-piercing instruments. It can also occur through transfusion of infected blood or transplantation of infected organ donations[4]. Mother-to-child transmission can occur antepartum (during the pregnancy), intrapartum (during labor/delivery) and postpartum (after delivery, through breast milk)[5].

Prevention should be approached in a combined fashion, taking into account both behavioral and social forces of the HIV epidemic. Interventions should encompass behavioral change counseling, access to anti-retroviral therapy, along with acknowledgment and removal of structural obstacles (including stigmatization and discrimination)[6].

Statement of Purpose. The purpose of this article is to provide information regarding HIV prevention. Although basics of antiretroviral therapies are included within the discussion, this document should not be utilized as a reference for treatment of HIV. Treatment availability varies greatly among point-of-care settings. The complexity of HIV treatment and emerging resistance is beyond the scope of this article and it is strongly recommended that additional resources be sought in regards to treatment of HIV.

2 HIV Testing

HIV testing is an essential component of prevention. Summarizing recent population-based health surveys, the World Health Organization (WHO) reports that less than 40% of people who are HIV positive are aware of their status[6]. A testing facility can represent an important source of education on prevention if such discussions are performed concurrently with counseling. Early diagnosis of disease enables access to treatment and care, and studies show that people who are aware of their own or their partner's positive HIV infection status are more likely to engage in safer sexual practices. Initiation of antiretroviral therapies (ART) will predictably decrease HIV viral load, thereby decreasing the likelihood of transmission to others[4, 7]. Testing of pregnant women is of particular importance in preventing maternal-to-child transmission. Since HIV infection typically does not affect fertility until fairly late in its disease course, many new HIV cases may be first diagnosed during pregnancy. Early initiation of either maternal antiretroviral treatment (ART) or antiretroviral prophylaxis (ARP) is associated with decreased rates of maternal-to-child transmission[8].

Typical HIV tests function by detecting an antibody to the HIV virus (as opposed to detecting the virus itself). The three antibody-based tests that are available utilize enzyme immunoassay (EIA), rapid HIV testing and western immunoblotting. These tests are not recommended for infants born to mothers who are HIV positive, or people who have received experimental HIV vaccines, as antibodies will be present in the blood stream regardless of infection status, thus introducing the possibility of a false positive result. Both Rapid HIV and EIA can be performed utilizing serum, plasma, whole blood or oral fluid. Both can detect HIV 1 and HIV 2. Rapid HIV testing takes 20–30 minutes for results and does not require special equipment. It is the ideal test for difficult to reach populations (intravenous drug users (IDUS), female sex workers, men who have sex with men (MSM) or geographically remote populations). EIA takes up to 2 hours to perform. The test must be performed in a lab and requires special equipment and skilled trained technicians. Multiple tests can be performed at once with EIA. Third and fourth generation EIA tests are more effective in detecting antibodies during the window period (the time period immediately following infection when antibody levels may be very low). Traditionally, EIA and Rapid HIV were considered screening tests, with Western Blotting being the confirmatory test. UNAIDS and WHO recommend combination of EIA and rapid HIV test for confirmation of positive screening test. As the Western blot test is more expensive, and studies show that combination EIA and rapid HIV tests provide results comparable to the EIA/Western Blot algorithm, the former combination of tests are more cost effective and thereby more useful in lower resource countries. Every country should select their own testing algorithm after evaluating each test's accuracy and operational characteristics. Polymerase Chain Reaction (PCR) which detects the genetic viral material can identify HIV in the blood stream within 2–3 weeks of infection. These tests require a blood sample. When available, such tests should be used for infants born to HIV positive mothers and detecting viral loads of people who are HIV positive[9, 10].

HIV testing should be available in Emergency rooms, Urgent care clinics, STD (sexually transmitted disease) clinics or any venue offering STI (sexually transmitted infection) services, TB clinics, substance abuse clinics, public health/community clinics, correctional health care facilities, and primary care offices. All adults, adolescents, infants born to mother's whose HIV status is unknown and children seen in pediatric health service centers should be offered testing. Partners and immediate family members of people who are HIV positive, people suspected of having TB, or who have TB, patients being treated for sexually transmitted infections (STI), people who exchange sex for money or other goods and intravenous drug users (IDUs) are considered to be at higher risk of acquiring HIV and should be tested/counseled more frequently[4, 11]. All pregnant women should be tested at their initial OB visit. In settings where there is high incidence of HIV (defined as greater than 17 cases per 100,000 persons per year) it is recommended that women receive additional testing in the third trimester[11]. All patients who receive HIV testing should be scheduled for follow up visits and counseling. Careful attention should be given to orphaned children, men who have sex with men, commercial sex workers, migrant workers, and alcohol or other substance abusers as they are at highest risk of being lost to follow up[12].

3 Prevention: Sexual Transmission

Interventions that decrease the rate of sexual transmission include behavioral change counseling, male and female condom programs, early initiation of ART, safe male circumcision, pre- and post-exposure prophylaxis and quality HIV testing and counseling for serodiscordant couples[6]. Studies have shown that male circumcision can decrease the risk of heterosexually acquired HIV infection in men by approximately 60%. HIV infection can be facilitated by several STIs (specifically genital ulcerative diseases); therefore early treatment of co-infections is an effective way of decreasing transmission. Studies have shown that early treatment with HAART (Highly Active Anti-Retroviral Therapy) in HIV infected partners in serodiscordant couples can provide up to 96% protection.

Proper use of condoms has been shown to decrease transmission rate of HIV by approximately 80% for vaginal intercourse and 64% for anal intercourse[4]. Latex condoms appear to be the most effective at inhibiting transmission. In the setting of a latex allergy, acceptable alternatives include polyurethane or polyisoprene condoms. A new condom should be used with every act of anal, oral or vaginal intercourse. Using water based lubrication assists in decreasing friction, which prevents condom breakage. Oil based lubrication can cause damage to condoms, making them less effective. Spermicides, such as nonoxynol 9 are not recommended as they cause irritation to the rectal and vaginal walls, thus increasing the chance of a mucosal tear which in turn increases viral acquisition. Female condoms have also been shown to be effective; however, knowledge of proper usage is much less widespread than that of male condoms. Proper usage of male and female condoms is particularly important to prevention efficacy. There should be awareness of common obstacles to condom usage such as poor acceptability, lack of control over use (people may lack negotiating skills), those that desire procreation, and availability of condoms. It is essential for clinics to have condoms readily available to their clients, along with access to counseling on proper usage and negotiating skills[2, 10]. It is vital to be aware which sexual practices to avoid in order to prevent HIV, such as douching (irritates protective mucosal lining). Intercourse should be avoided when an ulcerative genital lesion is present, or after any surgical procedure (female LEEP or cone; male circumcision) until the surgical site is fully healed[7].

Pre-exposure prophylaxis (PrEP) is a prevention strategy that continues to be studied. PrEP uses antiretroviral drugs in HIV-negative high risk populations (including MSM, IV drug users, sex workers and serodiscordant couples) in order to prevent HIV acquisition[13]. Several multi-country studies are currently examining the benefits of PrEP and the CDC is in the process of creating public health service guidelines on the use of PrEP among specific high risk populations. Results from early clinical studies are promising. The first PrEP trial to release results, entitled the iPrEx trial, demonstrated that daily use of tenofavir with emtricitabine (TDF/FTC; Truvada) (when combined with the comprehensive group of prevention services) provided an additional 44% protection to MSM. More recent studies, including the CDC's TDF2 study and the University of Washington's Partners in PrEP study, have shown that daily use of ARV drugs can decrease HIV acquisition in uninfected individuals exposed to the virus through heterosexual sex. The CDC has published interim guidelines for PrEP for HIV prevention in MSM. It is recommended that providers continue to wait until guidelines are available to initiate heterosexual PrEP regimens. If the provider feels that PrEP initiation is urgent, then the guidelines should be followed[13, 14]. Of note, it is important to emphasize the importance of adherence to antiretroviral medication (whether for preventative measures or therapy/treatment) as sporadic consumption of these drugs can lead to virus resistance.

4 Prevention: Blood-Borne Transmission

Education concerning safe needle use practices is important in preventing spread of HIV. Rehabilitation resources should be provided for those who inject IV drugs. Syringes should only be used when obtained from a reliable source such as pharmacies or needle exchange programs. Sterile water should be used to prepare drugs if possible. Containers or "cookers" should be disinfected and a new filter or "cotton" should be used when preparing drugs. Injection sites should be cleaned with alcohol prior to injection. Encourage safe disposal of syringes and needles after a single use only[1]. Health care facilities should also ensure stringent infection control practices, including standard precautions, injection/surgical safety and blood safety measures, safe waste disposal and postexposure prophylaxis for occupational HIV exposure[6].

Postexposure prophylaxis

Postexposure prophylaxis (treatment with highly active ARV HAART after exposure to virus) can be utilized to help prevent acquisition of HIV. Occupational exposure to HIV is defined as a percutaneous injury (needle stick or cut with a sharp object) or contact of a mucous membrane or non-intact skin with blood, tissue or other bodily fluids that are potentially virus infected (cerebral spinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid and amniotic fluid, semen and vaginal secretions). Feces, nasal secretions, saliva, sputum, sweat, tears, urine and vomit are not considered infectious unless they are visibly bloody[3]. Non-occupational exposures which offer substantial risk for HIV acquisition include exposure of the vagina, rectum, eye, mouth or other mucous membrane, non-intact skin or percutaneous contact with blood, semen, vaginal secretions, rectal secretions, breast milk or any bodily fluid that is visibly contaminated with blood. Postexposure prophylactic regimens involve a 28 day course of HAART therapy. Examples of possible regimens are described in **Table 1**. Each institution should provide prophylactic treatment based on what is available on formulary. Postexposure of HAART therapy must be initiated within 72 hours of potential contact[15]. Persons undergoing prophylactic treatment should receive an HIV test at the initiation of treatment, and again at 3 and 6 months following treatment[4].

Table 1: Possible regimens for postexposure prophylaxis

Type of exposure	Recommended medication/dosage
Less severe exposure (needle stick, or superficial injury) AND HIV-positive, class 1 (asymptomatic HIV infection or viral load <1500 ribonucleic acid copies/mL)	Zidovudine (AZT) 300 mg twice daily + Lamivudine (3TC) 300 mg daily or 150 mg twice daily Available as Combivir (300 mg AZT + 150 mg 3TC) 1 tab twice daily
	Zidovudine (AZT) 300 mg twice daily + Emtrictabine (FTC) 200 mg once daily
	Tenofovir DF (TDF) 300 mg once daily + Lamivudine (3TC) 300 mg once daily
	Tenofovir (TDF) 300 mg once daily + Emtricitabine (FTC) 200 mg once daily Available as Truvada (TDF 300 mg + FTC 200 mg) once tablet daily
Severe exposure (large-bore hollow needle, deep puncture wound, visible blood on device, or needle used in patient's artery or vein) OR HIV-positive, class 2 (symptomatic, AIDS, acute seroconversion or known high viral load)	Use one of the above regimens Plus . . .
	Lopinavir/ritonavir (LPV/RTV; Kaletra) 400 mg LPV/100 mg RTV twice daily with food
	Atazanavir (ATV) 400 mg once daily If used with Tenofovir (TDF), then ATV 300 mg + Ritonavir (RTC) 100 mg daily
Any type of non-occupational exposure	Efavirenz (EFV) 600 mg nightly + 3TC (300 mg daily) or FTC (200 mg daily) + AZT (300 mg twice daily) or TDF (300 mg daily)
	Lopinavir/ritonavir (co-formulated as Kaletra 400 mg/100 mg) 3 tabs twice daily + 3TC (300 mg daily) or FTC (200 mg daily) + AZT (300 mg twice daily)

5 Prevention: Mother to Child Transmission (MCT)

ANTEPARTUM

Table 2: Suggested first line ARV therapy for women requiring treatment for their own health

Recommended regimens	Dosing	Considerations
AZT + 3TC + NVP	AZT 300 mg twice daily 3TC 150 mg twice daily NVP 200 mg twice daily	• Regimen could potentially be provided as a fixed-dose combination • Favorable cost of regimen • Need for close clinical toxicity monitoring for first 12 weeks with use of NVP • NVP not recommended if CD4 count >350 cells/mm^3
AZT + 3TC + LPV/r	AZT 300 mg twice daily 3TC 150 mg twice daily LPV/r 400/100 mg twice daily	• High pill burden
AZT + 3TC + ABC	AZT 300 mg twice daily 3TC 150 mg twice daily ABC 300 mg twice daily	• Regimen could be provided as fixed dose combination

Maternal-to-child (vertical) transmission is responsible for approximately 90% of infections in children (age <15) who are HIV positive. The vertical transmission rate varies from 16 to 25% in mothers who do not receive ARV prophylaxis. This transmission rate can be decreased to 1–2% when mothers are treated with HAART[5]. As vertical transmission can occur during pregnancy (antepartum), throughout labor and delivery (intrapartum), and via breast milk, after delivery (postpartum) there are numerous interventions that can be made throughout these periods which can significantly decrease transmission rates. HAART treatment is shown to decrease maternal viral load in addition to providing the infant with preexposure prophylaxis. ARV medications that cross the placenta to enter the infant's circulatory system may provide adequate ARV levels prior to exposure to maternal blood and secretions. ARVs with known high placental transfer include Lamivudine (3TC), Emtricitabine (FTC), Zidovudine (AZT, ZDV), Abacavir (ABC), Stravudine (d4T) and Tenofovir (TDF)[8]. Recommendations put forth here are considered optimal but other drug combinations may also provide appropriate care to HIV positive mothers and infants. Not all facilities will have access to the same resources, including laboratory services and available medications. Each institution should use these recommendations to assist in creating individual guidelines based on available resources in their own local setting.

As discussed earlier, all pregnant women should be tested for HIV when they initiate prenatal care. WHO recommends rapid HIV tests at initiation of prenatal care. Chronic HIV treatment, along with cotrimaxazole for pneumocystis pneumonia (PCP) prophylaxis should be started the same day for all women who test positive in an effort to avoid loss to follow-up. TB screening and CD4 counts should also be performed at the point of access to care when available[12]. For patients known to be HIV positive, prior records (if available) should be reviewed. It is important to be aware of any previous HIV related illness, previous HIV therapy, previous CD4 counts and viral loads, and immunization status. If a laboratory facility is available complete blood count, renal and liver function tests, HIV viral load and CD4 count should be obtained[8].

Pregnant women who are HIV positive can be divided into 2 categories: those who require treatment for their own health (therapeutic category), and those who do not require treatment for their own health (prophylactic category). Women require therapeutic treatment if their screening CD4 count is less than or equal to 350 cells/mm^3, or if they have WHO clinical stage 3 or 4 disease (WHO clinical staging is described in Supplement A)[16, 17]. These women should be started on HAART treatment immediately, regardless of gestational age. Multi-drug regimens, which are effective and often accessible include zidovudine (AZT) with lamivudine (3TC) in combination with nevirapine (NVP), abacavir (ABC) or lopinavir/ritonavir (LPV/r). Regimens and dosing are described in **Table 2**. A viral load should be performed (if available) after 6 months of treatment to determine drug resistance. A viral load greater than 5000 copies/mL is indicative of resistance and alternative therapy is indicated[18]. Prophylactic treatment should be initiated after the first trimester (14 weeks). WHO describes two different regimens for maternal ARV prophylaxis. The first option includes twice daily AZT (300 mg twice daily). This should only be initiated if started early enough in pregnancy that at least 4 weeks of prophylaxis can be guaranteed prior to delivery. The second option includes triple ARV treatment. CDC- and WHO-recommended regimens are described in **Table 3**.

6 Prevention: Mother to Child Transmission (MCT)

ANTEPARTUM continued

Table 3: Suggested maternal triple ARV prophylaxis for HIV infected pregnant women who are not in need of treatment for their own health

Recommended regimens	Dosing	Considerations
AZT + 3TC + LPV/r	AZT 300 mg twice daily 3TC 150 mg twice daily LPV/r 400/100 mg twice daily	• High pill burden
AZT + 3TC + ABC	AZT 300 mg twice daily 3TC 150 mg twice daily ABC 300 mg twice daily	• Regimen could be provided as fixed dose combination
AZT + 3TC + EFV*	AZT 300 mg twice daily 3TC 150 mg twice daily EFV 600 mg once daily	• Effective contraception after delivery is required with use of EFV to prevent (subsequent) pregnancy
TDF + 3TC + EFV*	TDF 300 mg once daily 3TC 150 mg twice daily EFV 600 mg once daily	• TDF + 3TC use is recommended for women with hepatitis B infection requiring HBV treatment
TDF + FTC + EFV*	TDF 300 mg once daily FTC 200 mg once daily EFV 600 mg once daily	• Can be given as once daily regimen in a fixed-dose combination • TDF + FTC use is recommended for women presenting with hepatitis B infection requiring HBV treatment • Somewhat higher cost regimen

*EFV use is recommended for women presenting with TB

While the majority of HIV infections are with the pathogenic strains of HIV 1, pathogenic HIV 2 is also seen and is more commonly reported in Africa. The newer HIV tests are capable of distinguishing HIV 1 from HIV 2. The pathogenic strain of HIV 2 is associated with a lower maternal to child transmission rate, and maternal prophylaxis can be limited to single drug therapy with AZT. NNRTIs (non-nucleoside reverse transcriptase inhibitors) are proven to be ineffective in treatment of HIV 2.

Antiretroviral medications are associated with a variety of side-effects. Nevirapine (NVP) has been associated with liver toxicity in women with CD4 counts greater than 250 cells/mm^3 and therefore is not recommended as part of prophylactic regimens during pregnancy. Efavirenz (EFV) is not recommended for use during the first trimester of pregnancy as it has been linked to an increased risk of open neural tube defects. Basic considerations regarding ARV medication and pregnancy are included in Supplement B. One emerging concern about ARV use is the development of drug resistance particularly to NNRTIs. These drugs have longer half lives (2–3 weeks) and lower genetic barriers to resistance than many other antiretrovirals. When an NNRTI is utilized for prophylaxis, a minimum 7-day NRTI tail (e.g. twice daily AZT with 3TC) is recommended upon cessation to prevent NNRTI resistance. Basic treatment recommendations for women previously exposed to a NNRTI are described in **Table 4**[16].

Table 4: Choice of ART regimen for HIV positive women with prior exposure to PMTCT prophylaxis

Characteristics of previous ARV exposure	Recommendations
sd-NVP (+/- short course AZT) with no NRTI tail within the last 12 months	• Initiate a non-NNRTI regimen • 2 NRTIs + PI preferred over 3 NRTIs
sd-NVP (+/- short course AZT) with an NRTI tail within the last 12 months	• Initiate an NNRTI regimen • If available, check viral load at 6 months and if >5000 copies/mL, switch to second line ART with PI
sd-NVP (+/- short course AZT with an NRTI tail more than 12 months before	• Initiate an NNRTI regimen • If available, check viral load at 6 months and if >5000 copies/mL, switch to second-line ART with PI
All triple ART regimens, irrespective of duration of exposure and time since exposure	• Initiate an NNRTI regimen • If earlier triple ARV regimen was NNRTI-based and was stopped without administration of an NRTI tail, check viral load at 6 months, if available, and if >5000 copies/mL, switch to second-line ART with PI

7 Prevention: Mother to Child Transmission

INTRAPARTUM

Treatment during labor (intrapartum)

There are many interventions that can be made during labor and delivery in an attempt to prevent vertical transmission. Viral load should be obtained if possible prior to delivery. A viral load less than 1000 copies/mL is considered a safe level to attempt vaginal delivery. If maternal viral load is non-detectable, the risk of transmission during delivery is less than 1%. Artificial rupture of membranes should be avoided as every hour that passes prior to delivery after membranes are ruptured increases risk of vertical transmission by 2%[5]. If the viral maternal load is greater than 1000 copies/mL, then a cesarean section is recommended after 38 weeks' gestation[8]. There are conflicting opinions regarding mode of delivery when the viral load is unknown[5, 8]. In this case, decisions should be based upon clinical judgment, taking into consideration both maternal and infant morbidity and mortality risks. All ARV medications should be continued throughout the labor and delivery period. When available, intravenous AZT should be given, with a loading dose of 2 mg/kg infused over 1 hour, followed by 1 mg/kg/hour until delivery. If a cesarean section is planned, the initial dose should be given 3 hours prior to the operation (**Table 5**). Stavudine (d4T) and AZT should not be given concurrently as they are pharmacologic antagonists[8]. Single dose NVP is NOT recommended at the onset of labor secondary to increased drug resistance and low placental drug transfer[16].

Table 5: Key concepts in intrapartum care of HIV-positive mothers

IV AZT	Delivery mode	
Ideal for all laboring patients	**Low transverse cesarean section**	**Vaginal delivery**
Loading: 2 mg/kg/hour	• Viral load <1000 copies/mL	• Viral load <1000 copies/mL
Maintenance: 1 mg/kg/hour	• Perform at 38 weeks' gestation	• Avoid AROM and all internal monitors
TDF + 3TC + EFV	• Initiate AZT 3 hours prior to operation	• Continue IV AZT throughout labor

A note on abbreviations

ARV (antiretrovirals) – treatments that inhibit growth and/ or transmission of retroviral infections
ART (antiretroviral therapy) – treatment with anti-retroviral medications
HAART (highly active antiretroviral therapy) – treatment with combinations of potent antiretroviral medications (typical 3 or more different medications)

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8 Prevention: Mother to Child Transmission

POSTPARTUM

Treatment after delivery (postpartum)

Infants born to mothers who are HIV positive should receive NVP during the first week of life along with 6 weeks of AZT for postexposure prophylaxis[8, 16]. Simplified infant prophylaxis with these medications is described in **Table 6**. New infant feeding guidelines recognize the important role of breastfeeding in preventing neonatal morbidity and mortality in low resource countries. National or sub-national authorities should make official recommendations regarding breast feeding in HIV positive mothers. Recommendations should reflect the greatest likelihood of HIV-free survival of children without harming the health of the mother. In order to safely formula feed, clean water and sanitation must be assured to decrease the risk of infant diarrhea and malnutrition. The mother (caregiver) must be able to reliably provide a sufficient amount of infant formula to support normal growth and development of the infant for the first 6 months of life. All mothers must have sufficient access to health care that offers comprehensive child health services. In geographic locations where it is considered safer to breast feed, infants should be exclusively breast fed for the first 6 months of life. Heat-treating expressed breast milk is an optional alternative in special circumstances (when the infant is unable to breast feed, if the mother is ill, or ARVs are temporarily unavailable). Heat-treated breast milk, when done correctly, inactivates HIV and does not significantly alter the nutritional or immunological composition of breast milk. Between 6 and 12 months of life, complementary foods should be introduced while the child continues to breast feed. During this time period, it is safe to include boiled animal milk in the diet. Breast feeding should be gradually discontinued over one month only when an adequate diet without breast milk can be provided. The infant should continue daily AZT until 1 week following the cessation of breast feeding. Mothers should continue triple therapy prophylaxis during the course of breast feeding and for one additional week following the cessation of breast feeding, unless continuation of treatment is required for maternal health[19].

Table 6: Recommended infant prophylaxis

AZT		NVP	
Gestational age based dosing:		**3 doses in first week of life:**	
>35 weeks	4 mg/kg/dose twice daily	First dose at birth	
<35 weeks to >30 weeks	2 mg/kg/dose twice daily X 2 weeks, then increase to 3 doses daily (every 8 hours)	Second dose at 48 hours of life Third dose at 96 hours of life	
<30 weeks	2 mg/kg/dose twice daily X 4 weeks, then three doses daily (every 8 hours)		
Simplified weight based dosing		**Weight-based dosing**	
Birth weight >2.5 kg	15 mg every 12 hours	Birth weight >2 kg	12 mg/dose
Birth weight <2.5 kg	10 mg every 12 hours	Birth weight 1.5–2 kg	8 mg/dose

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