

Facts About HIV Infection, Prevention, and Treatment

This brief overview provides general information on HIV infection and AIDS, and should be supplemented as needed with other texts on the subject. Since knowledge about the disease and its effects on individuals is continually being updated, administrators and teachers should periodically review and update this information to ensure that it is accurate. The New York City Department of Health and Mental Hygiene (DOHMH) at www.nyc.gov/health provides New York City data, and the New York State Department of Health www.health.ny.gov provides data for New York State. Both offer many resources on prevention and treatment designed for the general public. (See also “Resources” in Appendix E.)

Certain terms used in this overview may be unfamiliar to some readers. While some terms are defined here, readers should also consult Appendix D, “Teachers’ Glossary,” for further explanation or for explanation of terms not defined here.

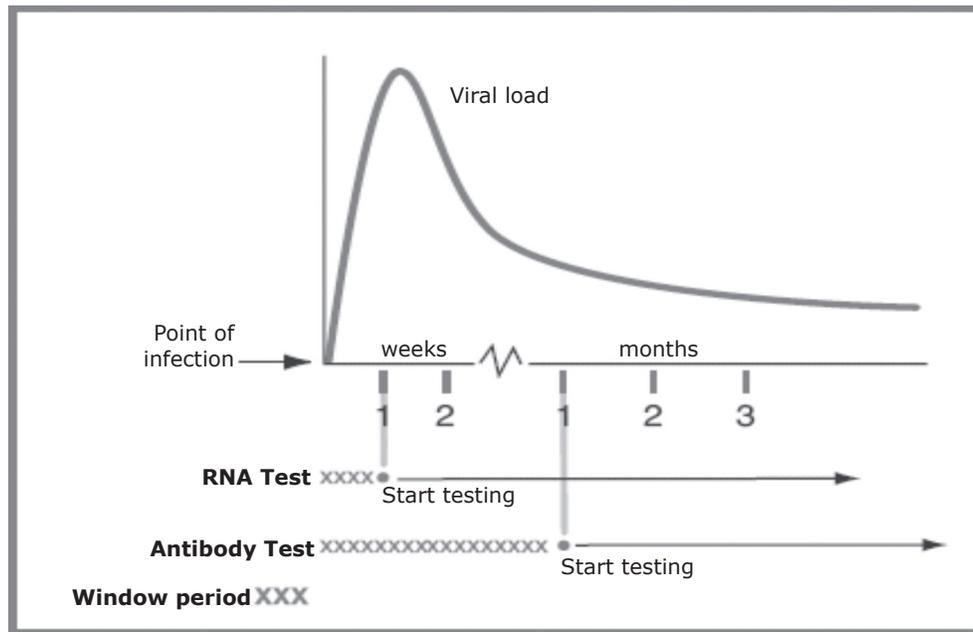
Description of HIV Infection and AIDS

- HIV (Human Immunodeficiency Virus) is a virus that impairs the body's immune system (the body's internal defense against diseases). It primarily targets certain white blood cells (called T-lymphocytes, Helper T-cells, or CD4 cells) that are a specific part of the immune system. If untreated, HIV can advance to AIDS (see below). Illnesses that may occur during AIDS may affect every organ system and impair the central nervous system.
- HIV infection is the condition of being infected with HIV.
- AIDS (Acquired Immune Deficiency Syndrome) is the advanced phase of HIV infection. It is not a specific disease itself, but rather a syndrome or collection of bodily conditions or health problems caused by HIV, and defined by a series of clinical criteria formulated by the Centers for Disease Control and Prevention (CDC). These criteria include a diagnosed HIV infection and the presence of one or more of 26 opportunistic infections (see next bullet) and clinical conditions, or a T-cell/CD4 cell count below 200 per cubic millimeter of blood. If left untreated, people with HIV may eventually develop AIDS.
- The immune system of people with AIDS has been severely weakened. Therefore, people with AIDS are vulnerable to specific diseases that rarely affect healthy adults. These are called opportunistic infections and include illnesses such as pneumocystis pneumonia (PCP), severe yeast infections, cytomegalovirus, herpes zoster, tuberculosis, toxoplasmosis, other parasitic infections, and certain cancers, such as Kaposi's sarcoma.

Spectrum and Course of HIV Infection and Disease

Untreated HIV infection passes through a series of phases. Phases are:

- Acute Phase (Primary HIV Infection) – from exposure and infection to development of antibodies, often accompanied by flu-like symptoms.
- Asymptomatic Phase – literally means “without symptoms”, though the person may experience a few symptoms, such as fatigue, swollen glands, and night sweats, and other signs that accompany most infections.
- Symptomatic Phase – vulnerability to common illnesses (like colds) and additional symptoms (like weight loss, diarrhea). Person may experience first hospitalization.
- AIDS – accompanied by symptoms due to the direct effects of HIV infection, such as wasting syndrome, along with symptoms from opportunistic infections.



Used with permission from King County Board of Health.
<http://www.kingcounty.gov/healthservices/health/communicable/hiv/publications/infograms/RNAtesting.aspx>

Individuals vary considerably in how quickly they pass through these phases. In any phase, treatment can halt the progress of the disease considerably. In 1996, the introduction of highly active antiretroviral therapy (HAART) changed the lives of many people with HIV or AIDS because it dramatically slowed the progression toward AIDS and decreased the death rate. It is for this reason that HIV is now considered to be a manageable long-term condition.

Because the symptoms after infection are fleeting or vague, many people with HIV are unaware they are infected. The CDC estimates one in five people with HIV are unaware of their infection; and one in four who test positive find out that they have already progressed to AIDS at the time of their first diagnostic test for HIV. The time from infection to appearance of significant symptoms or HIV-related illnesses varies significantly from person to person. HIV is infectious throughout its course. Individuals infected with HIV are capable of infecting others, even if they have no symptoms. This means that all people should take appropriate precautions to protect themselves and others from potential HIV transmission.

Transmission

Unlike flu or measles viruses, HIV is not transmitted through the air. To cause infection, HIV must be transmitted directly into the bloodstream or through a mucous membrane from an infected person to a non-infected person. For this reason, HIV-positive people do not pose a risk to others through any form of casual contact. There is no evidence that HIV is contracted through coughing, sneezing, food preparation, mosquito bites, drinking fountains, toilet seats, or other day-to-day contact.

- HIV is found primarily in the following four body fluids of an infected person:
 1. Blood, including menstrual blood.
 2. Semen and preseminal fluid, the clear fluid that appears on the penis after it is erect but prior to ejaculation. (This is sometimes referred to by the slang term "pre-cum." Encourage students to use correct terminology.)
 3. Vaginal fluid.
 4. Breast milk.

Other body fluids, including tears and saliva of an infected person, may contain scientifically detectable traces of the virus but do not contain enough of the virus to transmit it from one person to another.

- HIV can be transmitted from one person to another by any route that brings one of the above four body fluids into contact with the blood or mucous membranes of another person. The three major transmission routes are:
 1. Sexual intercourse: penile/anal, penile/vaginal, and oral (mouth to penis or mouth to vagina). Sexual transmission of HIV occurs by absorption of infected semen, blood, or vaginal fluid through mucous membranes and abrasions (tiny scratches or tears in delicate tissues during sexual intercourse).

Within the category of sexual transmission, there are differences in likelihood of transmission during any unprotected sexual act. Anal intercourse is the highest risk sexual behavior, meaning that it is the most likely mode of sexual transmission, whether it occurs between a man and a woman or between a man and a man. Because the anal mucosa is fragile, tissue tearing and bleeding frequently occur, although they may not always be noticed. These microscopic tears provide potential points of entry for HIV virus. Lymphatic tissue occurs all along the digestive tract, thus there are concentrations of T-cells, one of HIV's favorite targets, near the anus. Vaginal/penile intercourse poses risk to both men and women, but it has been documented that women are more at risk than men because of the more delicate tissue in the vaginal area, especially younger women (whose cervixes are not fully formed) and older, postmenopausal women (who may have experienced some thinning of the vaginal lining).

2. Exposure to infected blood. This occurs primarily through the sharing of equipment for the injection of drugs whether intravenously, intramuscularly, or under the skin. HIV can be transmitted by an infected person during use of syringes or needles or other equipment used by injectors (cotton, cookers, drug solution, and water) for drug injection. When people inject drugs, including steroids or hormones, small amounts of blood can remain in the needles, syringes, or other paraphernalia used in drug preparation. If these are then used by another person, HIV-infected blood can be injected into the next user's bloodstream.

Though much less likely, transmission may also occur through contact with open sores or cuts.

3. Perinatally, from an infected woman to her child(ren) during pregnancy, childbirth, or breastfeeding. However, transmission from an HIV-positive woman to her child through pregnancy, childbirth, or breastfeeding can be prevented. If a pregnant woman is under a doctor's care, the doctor should see that she gets counseling and testing for HIV. If she is HIV-positive, the doctor will see that she reduce the potential for HIV transmission to her child by taking medication during her pregnancy and delivering the child via Caesarean section (C-section). The infant should also receive medications after he or she is born, and is usually given formula instead of being breastfed, as there is a possibility of transmission through breast milk. In fact, in some countries where breastfeeding is common, one-third of the mother-to-child transmission is through breastfeeding, posing difficult choices, especially in countries where there are few supplements with the nutritional and protective value of breast milk.

Preventing transmission from HIV-positive women to their children is one of the "success stories" of HIV prevention in the U.S. In New York City in 1990 there were 321 cases of perinatal transmission. In 2008, there were fewer than ten cases.¹

Prevention

With the advent of effective treatment, people with HIV are living longer and the number of AIDS diagnoses and deaths are lower. But the availability of treatment may lull people into believing that preventing HIV infection is no longer important. While scientists are researching prevention methods such as vaccines and microbicides, these are years from availability.

Prevention remains critical. Major current prevention efforts and recommendations include:

- Preventing sexual transmission.
 - Abstinence from behaviors that can transmit HIV provides the surest protection against transmission of HIV and other STIs.
 - Consistent and correct use of a barrier method from beginning to end for each sexual act that can transmit HIV. Recommendations include the use of a male latex or polyurethane male condom or an FC2 condom ("female" or "insertive" condom), as a barrier against exchange of body fluids. Lambskin condoms should not be used, as the skin contains tiny pores through which potentially infected fluid can pass.

- On July 16, 2012, the U.S. Food and Drug Administration (FDA) approved Truvada, a drug previously only used to treat HIV, for daily oral use to help prevent HIV. The use of HIV medications as a preventive measure, to reduce the risk of becoming infected with HIV, is a strategy known as pre-exposure prophylaxis (PrEP). The recently approved pill contains medicines that prevent HIV from making a new virus as it enters the body. When used consistently, Truvada has been shown to reduce the risk of HIV infection among gay and bisexual men and heterosexual men and women who are at high risk for HIV infection. It is not intended to be used in isolation, but rather in combination with safer sex practices, such as correct and consistent condom use. Guidelines on its use from national health agencies are forthcoming. For more information, go to <http://www.fda.gov/downloads/NewsEvents/Newsroom/FactSheets/UCM312279.pdf>.
- Preventing transmission through exposure to blood.
 - Abstaining from illegal drug use, especially from practices that can transmit HIV and other bloodborne infections.
 - Seeking counseling or treatment for drug use, in order to cease or minimize drug use.
 - If continuing to inject drugs, using practices to reduce risk. These include:
- Using a new, sterile syringe for every injection. Sterile syringes may now be purchased without prescription in pharmacies in New York State, and syringe exchange programs throughout NYC provide them free of charge.
- If syringes must be re-used, they must be sterilized before use.

Using universal precautions during contact with or cleaning of blood or infectious materials in medical and household settings, including the use of latex gloves, disposable syringes, and disinfectant, and other infection control procedures, such as masks and sterilization equipment as necessary.

- Preventing perinatal transmission.

Seeking prenatal care so that pregnant HIV-positive women can be identified. They can then be offered treatment that will prevent transmission to the child and can be encouraged to use formula to prevent transmission via breast milk.

- Treatment as prevention.

Providing antiretroviral treatment to HIV-positive people early in their infection has been shown to dramatically decrease the chance that they will transmit the virus to their uninfected partners. NYC DOHMH now recommends that health care providers offer antiretroviral therapy to any person living with HIV, regardless of the person's CD4 count, both to benefit the individual's health and the health of their partners.

Prevention in all areas increasingly recognizes the role of individuals in taking responsibility not only for themselves but also for their partners.

Role of HIV Testing & Treatment

As effective treatment has evolved, the importance of HIV testing has increased. Only by knowing their HIV status can people seek treatment early in the course of HIV infection. Upon infection with HIV, the virus replicates itself very quickly, so there is a spike in the amount of virus in the blood (viral load). The increase in viral load makes the person more infectious, increasing the likelihood that the infected person can transmit the virus to a partner. HIV antibody tests have become more sensitive and are able to detect HIV sooner, although the window period is still three months.

Starting in September 2010, New York State Law requires that people from 13 to 64 years of age be offered HIV testing while seeking medical services in emergency departments, hospital inpatient settings, or outpatient primary care locations.ⁱⁱ Additionally, in November 2011, the American Academy of Pediatrics recommended that pediatricians offer routine HIV screening to all adolescents at least once by 16 to 18 years of age in health care settings.ⁱⁱⁱ The test is voluntary; before ordering or conducting an HIV test, a provider must first obtain a patient's verbal, and in some cases written, informed consent.

In New York City, HIV testing is widely available and is governed (in all settings) by specific New York State Law and New York State Department of Health regulations. New York State Law protects the confidentiality and privacy of all persons who test positive for HIV. A record of the test and the results are placed in the person's medical chart and providers are required to report HIV positive test results to the NYC DOHMH. This information is maintained under strict privacy regulations. Anonymous testing, in which the person's name is not linked to the HIV test result, is available only at select NYC DOHMH locations. Private providers and most city testing sites must follow named reporting requirements.

Because of the complexities of testing, adolescents should be encouraged to make careful and informed decisions about whether, when, and how to be tested and disclose results. If possible, they should seek out a testing facility where the staff is experienced with adolescents. There is no specific age of consent for HIV testing in New York State. Rather, the person administering the test must assess the person's "capacity to consent" individually.

Home HIV Test: On July 3, 2012, the Food and Drug Administration (FDA) approved a rapid self-administered over-the-counter HIV test kit for individuals ages 17 and over. The test uses oral fluid to check for antibodies to HIV Type 1 and HIV Type 2. The kit can provide an HIV test result within 20 to 40 minutes. A positive result with this test does not mean that an individual is definitely infected with HIV but rather that additional testing should be done in a medical setting to confirm the test result. Additionally, a negative test result does not mean that an individual is definitely not infected with HIV, particularly when an individual may have been exposed within the previous three months. Recommendations on its use are forthcoming. For more information go to: <http://www.fda.gov/BiologicsBloodVaccines/BloodBloodProducts/ApprovedProducts/PremarketApprovalsPMAs/ucm310436.htm>

Many options are available for HIV testing. They involve using different types of specimens, methods of collection, and waiting time to receive results.

- ELISA (enzyme-linked immunosorbent assay or EIA) test is the most commonly used HIV screening test; it detects antibodies that the body produces to fight HIV. Improvements in the ELISA test have made it more sensitive and able to detect infections sooner, however, the test cannot detect whether the infection is acute or chronic. The test is completed by testing a blood or oral fluid (inner cheek/gum) specimen for antibodies to the virus, not the virus itself. It can be offered as a standard blood test or oral rapid HIV test, where specimens can be processed in 20 minutes. If the results of either type of ELISA test are positive (HIV antibodies are found in the sample) then a confirmatory test must be completed.
- Western blot (enzyme immunoassays) or IFA (immunofluorescence assay) tests are confirmatory antibody tests that are more specific, resulting in fewer false positive tests than the ELISA. The Western Blot is most commonly used to confirm HIV positive ELISA tests.
- Virologic (antigen) tests (not antibody tests)
 - NAAT (HIV nucleic acid amplification testing), e.g., polymerase chain reaction [PCR] test. These tests detect the RNA of the virus or the HIV DNA in white blood cells infected with the virus. They are sensitive and can identify new infections sooner than other tests. However, they are expensive and require more technical skills, so they are less commonly used. Certain RNA tests can also detect the amount of virus in the body, and are also known as viral load tests.^{iv, v}

COMPARISON OF RNA AND ANTIBODY TESTS FOR HIV

	RNA/PCR/NAAT TEST	ANTIBODY TEST
Looks for	actual HIV virus	antibodies to HIV
Window period	1-2 weeks	1-3 months
Options for testing	blood, no rapid	blood, oral, rapid
Wait time for results	1-3 weeks	1 week, 20 minutes for rapid

Used with permission from King County Board of Health.

<http://www.kingcounty.gov/healthservices/health/communicable/hiv/publications/infograms.aspx>

- “4th generation” combination antibody/antigen HIV diagnostic assay. In 2010, the FDA approved the first HIV diagnostic assay that simultaneously detects both antigen and antibodies. “This test can be useful in extending diagnosis in earlier, acute phase (recent) infection with HIV, prior to the emergence of antibodies produced by the infected patient, effectively reducing the window period – that period after initial infection and before the detection of infection based on formation of detectable antibodies. The median detection time was demonstrated to be 7 days earlier (range 0 to 20 days) compared to 3rd generation enzyme immunoassay antibody tests to which they were compared.”^{vi}
- HIV infection diagnosed by a physician or qualified medical-care provider based on the laboratory criteria and documented in a medical record. Oral reports of prior laboratory test results are not acceptable.

CD4 count: The CD4 count is an important laboratory indicator of immune function in people who have HIV infection. It is a strong predictor of disease progression and survival. (See “Spectrum and Course of HIV Infection and Disease”)

Viral Load testing: (Plasma HIV RNA testing) is the most important indicator of response to antiretroviral therapy (ART). It is important for people with HIV to receive viral load tests on a regular basis.

HIV/AIDS Is a Global Issue

HIV/AIDS has affected every continent, and looms over countries that once imagined that they might be immune to its devastation. All people are equally vulnerable, and equally in need of knowledge about how to avoid infection and how to care for those who are already infected. Everywhere, the behaviors that put people at risk are the same: injection or transfusion of infected blood (outside the U.S., in countries where the blood supply may not be adequately protected), sexual intercourse with an infected partner, and being born to or receiving breast milk from an infected mother.

The populations with burden of HIV infection are in Sub-Saharan Africa; the fastest growing HIV epidemic is in India, and South and Central Asia. Eastern Europe and the former Soviet Union also are reporting rising rates of HIV diagnoses. The spread of the epidemic has created major global challenges of loss of human life, disruption of families, loss of the workforce, poor access to HIV treatment, and lack of prevention resources.

Advances in Treatment

There is no readily available “cure” for HIV; the infection remains in the body indefinitely. However, since the mid-1990’s, antiretroviral therapy or ART, has revolutionized the treatment of HIV infection. ART strengthens the immune system by stabilizing or increasing the number of CD4 cells and also by significantly reducing the ability of HIV to copy itself (that is, to replicate) within an infected person’s body. Nowadays, treatment is safe and well-tolerated, causing fewer side effects. The NYC DOHMH now recommends starting treatment upon diagnosis with HIV infection, regardless of the CD4 count. The recommendation is based on evidence that ART can both improve the health of people infected with HIV, and prevent transmission from an HIV-infected person to an uninfected sexual partner. To ensure that treatment remains effective, people with HIV need to be seen regularly by a medical provider with experience managing ART, who can also support their lifelong commitment to ART.

Antiretroviral therapy has extended life expectancy of many people being treated for HIV infection, making a diagnosis with HIV comparable to some other chronic diseases that require treatment and monitoring, but allow for higher quality of life. As a long-term disease affecting all areas of life, living with HIV is dramatically improved by a variety of supportive services that assure access to treatment, and support with adherence to ART. Special programs and providers ensure that access to HIV care and ART are available to low-income, underinsured, and uninsured people.

Although adolescents are legally allowed to consent for HIV testing in New York State, they are only allowed to consent for HIV treatment under certain circumstances:

- If they are legally emancipated
- For emergency care
- When parental involvement is impossible or could cause harm or
- When the minor is sufficiently mature to follow the treatment regimen

The Role of Schools and Communities

Schools can be an effective setting for educational and support services around HIV prevention and treatment. By stimulating awareness, providing factual information, training students in decision making and negotiating, reducing stigma, and helping students learn to educate themselves and others, schools can be powerful influences not just on students, but indirectly on their entire communities.

The future of HIV depends on both students and their communities. Much of the history of fighting HIV was created by individuals concerned about themselves and others, who organized grassroots efforts to lobby for research, treatment, and improved services. This tradition continues in the form of the many community-based organizations that provide prevention and treatment assistance.

HIV/AIDS in Children and Adolescents

Adolescence is a period of intense physical and psychosocial changes, usually beginning and ending in the second decade of life.... [T]he changes of puberty are a marvel of nature and a testimony to the intricacies and wonders of the human hormonal system.^{vii}

Adolescence is sometimes likened to infancy: During no other times in a person's life is growth so rapid and transforming. Adolescents (sometimes defined as individuals aged 13 to 21 years) often seem to veer between childhood naiveté and adult-like maturity. Some seem not to be in a hurry to grow up, while others yearn to take on the responsibilities and privileges of adulthood. Some adolescents, perhaps lacking a protective family structure, feel they have no choice but to grow up fast and take care of themselves. Adolescents often feel concerned or confused about whether body changes and related emotional turbulence are normal.

The "tasks" of adolescence include learning to be independent of parents, developing strong relationships with peers, becoming comfortable with one's transforming body, developing sexual and vocational identities, and defining one's character and personality.

Adolescents seeking to define themselves often experiment with new behaviors. Their series of trials (and sometimes errors), along with parental and teacher guidance and peer input, shape the adults they will become. While exploring the world can be an exciting and rewarding part of growing up, engaging in risky sexual activity and using alcohol and other drugs can lead to HIV infection, STIs, or problems associated with substance use. Adolescents need to learn not only the risks involved with these behaviors, but also the skills (decision making, assertiveness, etc.) that will help them withstand negative peer pressure and make healthier choices.

ⁱ Pediatric HIV/AIDS Surveillance Update (June 2010).

ⁱⁱ <http://home2.nyc.gov/html/doh/downloads/pdf/ah/ch308.pdf> (Accessed 2.4.2012)

ⁱⁱⁱ Adolescents and HIV Infection: The Pediatrician's Role in Promoting Routine Testing. *Pediatrics*, 128(5),1023-1029

^{iv} <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5846a3.htm>

^v <http://www.fda.gov/ForConsumers/ByAudience/ForPatientAdvocates/HIVandAIDSactivities/ucm216409.htm> (Accessed 1.17.2012)

^{vi} <http://www.fda.gov/ForConsumers/ByAudience/ForPatientAdvocates/HIVandAIDSactivities/ucm216409.htm>

^{vii} Lawrence S. Neinstein, M.D. *Adolescent Health Care: A Practical Guide*, 2nd edition. Urban & Schwarzenberg, Baltimore-Muviinich, 1991.

Psychosocial Development of Adolescents¹

TASK	EARLY ADOLESCENCE	MIDDLE ADOLESCENCE	LATE ADOLESCENCE
Independence	Less interest in parental activities	Peak of parental conflicts	Integration of parents' advice and values
Body image	<ul style="list-style-type: none"> • Preoccupation with self and pubertal changes • Uncertainty about appearance 	<ul style="list-style-type: none"> • General acceptance of body • Concern over making body more attractive 	Acceptance of pubertal changes
Peers	Intense relationships	<ul style="list-style-type: none"> • Peak of peer involvement • Conformity with peer values • Increased sexual activity and experimentation 	<ul style="list-style-type: none"> • Peer group less important • More time spent in sharing intimate relationships
Identity	<ul style="list-style-type: none"> • Increased cognition • Increased fantasy world • Idealistic vocational goals • Increased need for privacy • Lack of impulse control 	<ul style="list-style-type: none"> • Increased scope of feelings • Increased intellectual ability • Feelings of omnipotence • Risk-taking behavior 	<ul style="list-style-type: none"> • Practical, realistic vocational goals • Refinement of moral, religious, and sexual values • Ability to compromise and to set limits

Skill Building for Adolescents

Adolescents are continuously developing complex social and cognitive skills. Adolescents need to not only be able to identify risk, but to understand risk-reduction strategies, and to develop and practice the decision-making and communication skills to use them. These skills include effective decision-making, limit-setting, assertive communication, negotiation, and refusal.

HIV Resources for Adolescents

HIV testing is encouraged for every sexually active person. Programs like "The Bronx Knows" and "Brooklyn Knows" have effectively resulted in many thousands more people being tested for HIV in New York City. State law (Chapter 308 of the laws of 2010) states that all persons aged 13-64 who seek healthcare in hospital emergency departments, inpatient units or outpatient primary care clinics/private practices will be offered an HIV test at least once.

More adolescents know that HIV testing is available. Adolescents need to know where to go to obtain counseling and comprehensive health care, both preventive and therapeutic. Some teens have access to school-based clinics and independent multi-service centers dedicated to adolescent care, and many health care service providers outside of school offer free or low-cost services.

By increasing adolescents' awareness of both wellness and health risks, schools can help guide them toward a lifelong practice of healthier behaviors. Additionally, informed adolescents can become educated consumers of healthcare, learning how to ask the right questions and how to obtain the services they need and to which they are entitled.

Improvements in adolescent treatment for HIV (antiretroviral therapy or ART) have made it easier for young people to tolerate the medications and have allowed teens to stay healthier longer. Young people should see a specialist who is an expert in HIV and also in working with adolescents. (See Appendix E for "Resources and More Information.")

¹ Lawrence S. Neinstein, M.D., *Adolescent Health Care: A Practical Guide*, 2nd Edition. Urban & Schwarzenbag. Baltimore-Munich, 1991.