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# HIV infection and its implication for nurse leaders

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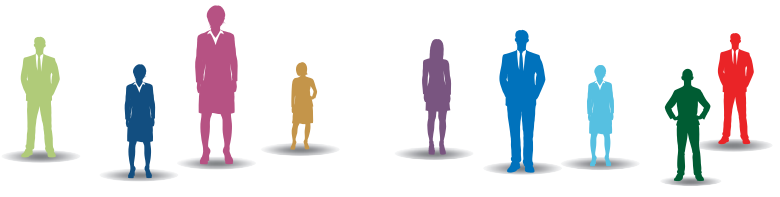
Since its emergence in the early 1980s, HIV infection in the United States has evolved from an acute debilitating condition to a chronic, treatable illness. Patients with HIV infection are at risk for various comorbidities and adverse reactions associated with long-term medication administration, as well as disorders associated with normal aging and chronic HIV infection.

Because HIV infection impacts every age group and can cause multisystem disease, you're likely to see patients with HIV infection across all settings. This article provides an update on HIV infection for the nurse leader and discusses implications for nurse administrators.

## Global problem

An estimated 34 million individuals throughout the world are living with HIV infection. Two-thirds of these people can be found in sub-Saharan Africa, which accounts for 23.5 million people living with HIV. In contrast, approximately 1.1 million adults and adolescents in the United States are living with HIV infection or AIDS.[1]

The estimated number of people with HIV infection or AIDS has increased because treatment advances have significantly prolonged the lives of those with HIV. Each year, there's approximately 50,000 new cases in the United Sates.[2] With increased public awareness of HIV infection; the simple strategy of using a latex condom to prevent HIV transmission; and routine



testing in physician offices, EDs, and hospitals, the rates of new infection should, ideally, be declining. However, various social, cultural, biological, political, and even financial factors help explain why HIV transmission continues to occur at such an alarming rate.

### Screening for HIV infection

Of the 1.1 million Americans with HIV infection, an estimated 180,000 are unaware they're infected. Transmission risk behaviors decrease among those aware of their HIV status, so this can be an important prevention strategy.[3]

***Remove barriers to HIV testing and ensure that all healthcare providers have the appropriate training and resources.***

Since 2006, the CDC has recommended that all people between ages 13 and 64, regardless of risk, be screened for HIV infection as a routine healthcare measure. Annual screening is recommended for individuals at continued risk for HIV infections, such as those who inject illicit drugs or engage in unprotected sexual intercourse. Patients can be screened for HIV infection during a routine healthcare visit, along with screenings for dyslipidemia, hypertension, and diabetes. Because not all Americans receive regular healthcare, the CDC also recommends routine HIV infection testing in acute care hospitals and EDs using an opt-out methodology; that is, everyone is informed of the availability of HIV testing at the point of care, and is offered an HIV test with the right to decline testing. This method of surveillance has been effective in identifying those with HIV infection who would otherwise not be tested because they're not regular consumers of preventive health services.

This strategy of HIV surveillance has implications for nurse leaders. In many settings, it's often the nursing staff members who inform patients of the availability of HIV testing upon admission or at triage, and will handle the request for an HIV test should the patient desire testing. Screening for HIV infection is easily done in almost any setting and can easily be performed by the nurse or unlicensed assistive personnel.[4] (See *Table 1*.)

Barriers to routine testing continue to exist—surprisingly, not with patients but with providers. Many don't offer testing because they don't think that patients may be at risk or that the patient may perceive the recommendation to test as accusatory or judgmental about his or her lifestyle. Providers also report that time constraints during a visit limit the ability to recommend testing and perform a test. There's also the belief that counseling and testing requires special training and that there's a lack of infrastructure to handle patients who test positive.[5]

An important leadership responsibility is to remove barriers to HIV testing and ensure that all healthcare providers have appropriate training, resources, and infrastructure in place to support the newly diagnosed patient. Early and individualized linkages to care by nurses or patient navigators significantly impact care retention. Many professional organizations and groups have supported routine testing and provide education and guidance for healthcare leaders (see http://www.edhivtestguide.org).

### HIV treatment update

Since 1996, HIV infection treatment has focused on combining drugs from different HIV drug classes. All combinations should include two drugs from the nucleoside reverse transcriptase inhibitor (NRTI) class, with either a nonnucleoside reverse transcriptase inhibitor (NNRTI), an integrase strand transfer inhibitor (INSTI), or a protease inhibitor (PI) boosted with ritonavir. Revisions to treatment recommendations are frequent; as new knowledge about drug efficacy and combinations emerge, current recommendations can be found at http://aidsinfo.nih.gov/contentfiles/lvguidelines/adultandadolescentgl.pdf.

The decision to begin anti-HIV therapy, or what's commonly called antiretroviral therapy (ART), in patients with HIV infection has historically been based on the patient's T-lymphocyte (CD4) cell count. The CD4 cell count is a key marker of immune system health in patients with HIV infection. The lower the count, the more damage HIV has done. Anyone with a CD4 cell count of less than 200 T-lymphocytes/mm$^3$, or

an AIDS-defining illness, is considered to have AIDS. Without treatment, people with AIDS are at higher risk for AIDS-related illnesses, commonly known as opportunistic diseases. Because the immune system is weakened in people with AIDS, some of these illnesses can be life-threatening and require hospitalization.

Current guidelines recommend starting ART in all patients, regardless of CD4 cell count.[6] Nurses play a critical role when the decision has been made to start a patient on ART. Before patients are started on a new ART regimen, the nursing assessment should include a comprehensive evaluation of patient readiness. (See *Table 2*.)

Therapy with these medications is life-long and, once started, generally continues without interruption. Nursing staff members need to teach patients that these medications must be taken exactly as prescribed. If they miss doses, the virus can become resistant to the medication, rendering the therapy ineffective. A virus that's resistant to one drug in a class can become resistant to other drugs in the same class, limiting the number of drugs available for treating the patient.

All ART medications cause adverse reactions; without proper education, patients who experience unpleasant reactions may discontinue their medication. For example, most patients who take efavirenz experience vivid hallucinations during sleep or dizziness during the day for the first 2 to 4 weeks after starting the drug. To minimize these reactions, patients must be taught to take this medication at bedtime and advised to alter their activities until they can work through the period of medication adjustment.

### Table 1: HIV testing

Conventional testing for HIV infection is done via lab analysis of a blood sample, which may delay diagnosis. More rapid testing that produces results in 20 minutes is available. It's easy to use and doesn't require lab facilities or highly trained staff.*+

To perform an oral test, place the pad of the device above the patient's teeth along the outer gum and swab once around both the upper and lower gums to collect oral mucosal transudate from the patient's mouth. Insert the device into a vial containing the developing solution.

In 20 minutes, the device indicates whether HIV-1 or HIV-2 antibodies are present. If one line appears on the strip, the person isn't infected with HIV (with 99.8% accuracy). If two lines appear, the patient is likely infected (99.3% accuracy). If the result is positive, it must be confirmed with additional testing called a Western blot.

*Administrators and nurse leaders must be aware of applicable state laws that may or may not include requirements for pretest counseling, written consent, and posttest counseling.

+Under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), tests are categorized by the complexity of the test. The more procedural steps and requirements for user interpretation, the more restrictions are placed on who can perform the test. CLIA-waived tests are simple lab tests where the likelihood of erroneous test results is negligible. This discussion focuses on CLIA-waived tests.

**Resources:**

CDC. Advantages and disadvantages of different types of FDA-approved immunoassays used for screening by generation and platform. http://www.cdc.gov/hiv/pdf/testing_Advantages&Disadvantages.pdf.

CDC. State HIV testing laws: consent and counseling requirements. http://www.cdc.gov/hiv/policies/law/states/testing.html.

### Table 2: Is your patient ready for ART?

**Before starting therapy, assess your patient's:**

- basic knowledge of HIV infection, transmission, and prevention
- understanding of ART and potential adverse reactions
- ability to comprehend, cope, and adhere to the prescribed therapy
- willingness to create support systems to cope with HIV status and facilitate treatment, such as disclosing status to family, friends, and partners.

**After starting therapy, assess your patient's:**

- advanced knowledge and skills to cope and manage HIV status and treatment
- ability to recognize and seek care for opportunistic diseases and complications.

**Evaluate your patient's:**

- level of HIV knowledge, personal autonomy, skills, and confidence to manage the consequences of HIV status and treatment
- capacity to take action that encourages health and discourages the determinants of ill health, such as substance abuse and unsafe sexual practices.

Also, patients must be taught to report any adverse reactions they experience to their healthcare provider, and clinicians must emphasize that patients should never stop taking the medication on their own. Patients are advised to return within 2 weeks to evaluate their response to the new regimen. This includes monitoring for adverse reactions, such as blood dyscrasias and abnormal serum glucose or lipid levels that can occur with most ART medications. After 4 to 8 weeks of therapy, the healthcare provider will also order several blood tests to evaluate the patient's response to therapy.[6]

The two most important biomarkers of successful response to ART are the evaluation of the viral load, by measuring serum HIV-RNA levels, and the CD4 cell count. The goal of initial ART is to achieve

a rapid reduction in the viral load below the lower limit of detection, which is generally less than 200 copies of HIV-RNA. (The specific value could be lower and depends on the commercial test that's used.)

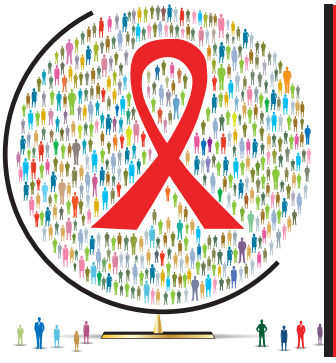
The second treatment goal is an increase (or preservation) in CD4 cell count. Many patients who start therapy with CD4 cell counts over 350, and have a good response to therapy, can expect to normalize their CD4 cell counts. Nurses must assess patients who don't meet these therapeutic goals for adherence to therapy, drug-drug interactions, and drug resistance.

Knowledge in HIV care is complex and evolving, and consultation with an HIV specialist is often warranted (such as when the virus demonstrates drug resistance). Nurses can become HIV specialists; the Association of Nurses in AIDS Care (ANAC) is a nursing specialty organization with a mission to promote nursing, the advancement of nursing knowledge, and leadership in matters related to the care of HIV-infected individuals. Nurse leaders can advance nursing knowledge in HIV care by supporting and even participating in the ANAC. It publishes standards in HIV nursing, and a core curriculum in HIV/AIDS nursing. Nurses and advanced practice nurses can establish competency in HIV/AIDS nursing through HIV/AIDS nursing certification.

### Contemporary issues in HIV care

With more effective therapy for HIV infection and earlier detection, the incidence of once-common opportunistic diseases, such as cryptococcal meningitis, esophageal candidiasis, histoplasmosis, and *Pneumocystis jiroveci* pneumonia has decreased. But as patients live longer, cardiovascular disease (CVD), chronic renal disease, and cancers that usually aren't seen in patients with AIDS (such as anal and lung cancers) are increasingly common. These complications may be due to a combination of:

- chronic immune system activation triggered by HIV
- ART adverse drug reactions
- human papillomavirus coinfection
- behavioral factors, such as smoking, chronic alcohol abuse, and illicit drug use
- normal age-related changes.



***With more effective therapy for HIV infection and earlier detection, the incidence of once-common opportunistic diseases has decreased.***

### *CVD*

HIV infection is a strong risk factor for CVD and has emerged as an important cause of death in HIV-infected individuals. However, the relative contribution of traditional CVD risk factors (smoking, dyslipidemia, and hypertension), HIV ART, or chronic immune system activation by HIV, plays into the pathophysiology of CVD in HIV-infected persons. There's some evidence to suggest that HIV medications may be partly to blame.[7,8] The Data Collection on Adverse Events of Anti-HIV Drugs Study Group, the largest database on CVD risk factors in HIV-infected patients, demonstrated that subjects had an increased incidence of acute myocardial infarction (AMI) that was proportionate to the cumulative duration of ART, particularly the PIs indinavir and lopinavir/ritonavir and the NRTIs abacavir and didanosine. NNRTIs weren't linked to a higher incidence of AMI. Newer ART agents weren't in use at the time of the study. Conversely, the HIV Out-Patient Study didn't find an association between specific ART agents or classes and CVD, but detected a significantly increased association with traditional CVD risk factors.[9]

Compared with people in the general population, a greater proportion of patients with HIV infection have one or more risk factors for CVD (such as smoking, hypertension, or insulin resistance/diabetes) that may cumulatively contribute to higher rates of CVD. HIV treatments may also contribute to CVD because NRTIs, NNRTIs, PIs, and INSTIs are associated with dyslipidemia. How these medications cause dyslipidemia varies by drug class.

To combat the effect of lipid accumulation, a non-PI–based regimen (such as raltegravir combined with tenofovir and emtricitabine) may be prescribed. If a PI-based regimen is indicated, atazanavir or darunavir with a low dose of ritonavir can be used.

Nurses should teach patients about CVD risk-reduction strategies that include smoking cessation, diet modification, and physical activity. Monitor the patient's fasting lipid profile at baseline, at 4 to 8 weeks after starting a new regimen, and then annually or more frequently, if indicated (in high-risk patients or in patients with abnormal baseline levels). Generally, if lifestyle or ART regimen modifications don't achieve lipid goals, adding antidyslipidemic agents to the regimen is considered. When using antidyslipidemic agents in HIV-infected patients, it's important to consider potential drug-drug interactions with ART. For example, certain statins, such as simvastatin and lovastatin, are contraindicated with PIs due to a serious drug-drug interaction. Nurses should also teach patients not to discontinue medications without consulting their HIV specialist. Not only will this increase the viral load and decrease CD4 cell count, but it's also associated with an even greater risk of cardiovascular events.[10]

**Table 3: Key components of medication adherence counseling**

Establish trust and bidirectional communication. Provide simple explanations and education on:
- medication dosage and schedule
- management of common adverse reactions
- relationship of adherence to the efficacy of PrEP
- signs and symptoms of acute HIV infection and recommended actions.

Support adherence:
- tailor daily dose to the patient's daily routine
- identify ways to remind patients about daily dosing to minimize forgetfulness
- identify and address barriers to adherence.

Monitor medication adherence in a nonjudgmental manner:
- normalize occasional missed doses, while ensuring that the patient understands the importance of daily dosing for optimal protection
- reinforce success
- identify factors interfering with adherence and address them with the patient
- assess adverse reactions and plan how to manage them.

Source: CDC. Preexposure prophylaxis for HIV prevention in the United States—2013: a clinical practice guideline. http://www.cdc.gov/hiv/pdf/PrEPguidelines2014.pdf.

### *Renal disease*

HIV infection is associated with several renal syndromes, including chronic renal failure. Renal disease linked to HIV infection includes thrombotic microangiopathic renal diseases, immune-mediated glomerulonephritis, and HIV-associated nephropathy (HIVAN).[11]

Kidney function is abnormal in up to 30% of HIV-infected patients. The most common complication is HIVAN, a disease characterized by massive nephrotic proteinuria (often more than 10 g/day), the absence of edema, and large echogenic kidneys seen on ultrasound. If left untreated, HIVAN can progress to renal failure in 1 to 2 years. HIVAN is almost always seen in patients with advanced immunosuppression (a CD4 cell count under 100).[12]

HIV medications can also cause renal dysfunction. Tenofovir, the most widely prescribed NRTI and the preferred drug in treatment-naive patients, can cause tubular injury that leads to renal tubular dysfunction and a decrease in the glomerular filtration rate (GFR). Because patients may have concurrent illnesses that may affect the kidneys (such as dehydration), it's hard to be certain that any one drug alone is responsible for renal disease. As a class, PIs (lopinavir, atazanavir, and indinavir) may cause renal failure and indinavir and atazanavir may precipitate nephrolithiasis.[13]

Nurses should monitor patients for abnormalities in glucose metabolism or hypertension, which are common risk factors for renal disease. When patients experience gastrointestinal (GI) symptoms such as diarrhea or vomiting, advise them to drink plenty of water to prevent dehydration, which may result in acute kidney injury.

Many drugs administered as part of treatment or used to prevent opportunistic infection (such as trimethoprim/sulfamethoxazole for *P. jiroveci* prevention) are nephrotoxic. Screen patients for changes in renal function by calculating the patient's GFR using either the modified Cockcroft-Gault formula or the Modification of Diet in Renal Disease equation (both calculators are readily available online or as apps for a smartphone).

### *Cancer*

The early HIV epidemic was defined by malignancies, such as Kaposi sarcoma and central nervous system non-Hodgkin lymphomas. The incidence of these two AIDS-defining malignancies (ADMs) has declined dramatically. Today, non-AIDS-defining malignancies (non-ADMs) are more common than ADMs. In the pre-highly active ART period, the period of no effective HIV treatment for 15 years (1981-1996), death from non-ADMS was at 1%; today it's at 13%. The most frequently reported fatal non-ADMs are lung cancer (20%); cancer of

the GI tract, such as gastric or hepatocellular carcinomas (13%); anal cancer (7%); and cancers of the hematologic system, such as Hodgkin lymphoma (7%).[14,15]

The increased incidence of non-ADMs may be related to improvement in life expectancy with ART, premature aging, loss of control of oncogenic infections due to HIV-related immune suppression, and a high prevalence of exposure to other carcinogens such as tobacco and alcohol.

### Case management in HIV

Successful outcomes (typically measured by an undetectable HIV-RNA level) in HIV are directly related to having patients linked to an HIV care provider and maintaining patients in care. Nurses play an important role in identifying newly infected patients through screening activities in clinics, EDs, and inpatient settings. They also have several opportunities to identify individuals who have fallout of care and can implement strategies to successfully reengage them. Nurse administrators must ensure that the appropriate resources and infrastructure exist, so that clinical nurses can easily and successfully reengage these individuals.

Nurse case managers are important members of a team of individuals who work together to successfully retain HIV-infected individuals in care. The team might include physicians, advanced practice nurses, clinical nurses, clinical pharmacists, social workers, and patient navigators. Engagement strategies can be low-tech, such as reminder calls, nurse clinic visits, and group meetings; more sophisticated, such as electronic device reminders (cell phones, text messaging, social media); or resource intensive, such as mobile engagement teams. Intensive case management is important for high-risk individuals; the newly diagnosed; those with food, housing, and transportation insecurity; the homeless; and adolescents and young adults with HIV. Case management is seen as an essential component of a successful HIV program.

### Preparing for what's next

Preexposure prophylaxis (PrEP) with oral antiretroviral treatment for HIV-uninfected individuals has been potentially useful in controlling HIV epidemics. The Preexposure Prophylaxis Initiative study, released in November 2010, provided definitive evidence about the safety and efficacy of oral daily emtricitabine-tenofovir for HIV prevention in men who have sex with men (MSM).[16,17] In July 2012, following the publication of additional clinical trials of PrEP in heterosexual populations, the FDA-approved emtricitabine-tenofovir for daily use in conjunction with safer sex practices to prevent HIV acquisition among MSM and other high-risk populations.

The impact on healthcare organizations is that more and more patients may present themselves to clinics and EDs requesting prescriptions for oral antiretroviral treatment. Nurse leaders must prepare all staff members for managing such requests. Taking a sexual history and injection drug use practices history should be a routine part of clinical care to determine the risk of HIV acquisition. Staff members must be comfortable in recommending prevention methods for those at risk, including PrEP for those at high risk.

An effective program to help treat these patients should include testing for other sexually transmitted infections and HIV testing if indicated. Nurse administrators must ensure that processes for follow-up and delivery of tests results are in place. After oral antiretroviral treatment is initiated, patients should return for follow-up every 3 months. Similar to HIV treatment, adherence to daily dosing is paramount. Nurses are key members of the healthcare team who influence and reinforce adherence instructions, and leaders need to make sure nurses understand the adherence instructions. (See *Table 3*.) For more information and clinical guidance on oral antiretroviral treatment programs, you can check the CDC website for clinical practice guidelines and provider materials at http://www.cdc.gov/hiv/prevention/research/prep/.

### Caring beyond specialties

Nursing involvement in matters related to HIV extends beyond the HIV clinic. Today, nurses in all setting are likely to engage patients at risk for or already infected with HIV infection. Nurse administrators must ensure that all nurses, regardless of practice settings, have competency taking sexual histories and screening for HIV infection; have knowledge of the signs and symptoms associated with HIV disease; offer and perform HIV testing; and are comfortable discussing risk-reduction strategies for people at risk for or with HIV infection. Nurses play an essential role in patient education regarding medication adherence and symptom management, and can be an essential part of the healthcare team that successfully retains individuals in care. NM

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The author and planners have disclosed that they have no financial relationships related to this article.

This is an updated version of the article that appeared in the January 2011 issue of *Nursing2014*.

DOI-10.1097/01.NUMA.0000453933.02645.13



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