This is a corrected version of the
article that appeared in print.

Preventive Counseling, Screening, and Therapy for the Patient with Newly Diagnosed HIV Infection

ANN M. KHALSA, M.D., M.S.ED., *University of Southern California, Keck School of Medicine, Los Angeles, California*

The epidemic of human immunodeficiency virus (HIV) continues, and the infection is converting into a treatable chronic disease; therefore, it is increasingly important for family physicians to be current with and comfortable in providing basic care to patients infected with HIV. Important aspects of counseling and patient education include stabilization of psychosocial issues and prevention of HIV transmission through behavior change counseling. Reporting HIV and acquired immunodeficiency syndrome (AIDS) is mandatory in most states, whereas partner notification laws vary from state to state. Baseline evaluation includes screening for comorbid conditions such as viral hepatitis, syphilis, and tuberculosis, as well as common HIV-related manifestations such as recurrent candidal infections and thrombocytopenia. Baseline testing includes $CD4^+$ T-lymphocyte cell counts and HIV viral RNA levels to assess HIV disease stage, and numerous studies to screen for opportunistic infections. Initial preventive interventions include patient education to reduce exposure to infections, treatment of comorbid conditions such as human papillomavirus-related dysplasia, and vaccinations such as for pneumococcus and hepatitis B. Prophylaxis against opportunistic pathogens is recommended when $CD4^+$ cell counts fall below 200 cells per mm^3. Lastly, the indications for antiretroviral therapy include symptomatic patients or those with AIDS, and pre-AIDS patients with $CD4^+$ cell counts of 200 to 350 cells per mm^3 or HIV RNA above 55,000 to 100,000 copies per mL. (Am Fam Physician 2006;73:271-80. Copyright © 2006 American Academy of Family Physicians.)

▶ See editorial on page 215.

As the prevalence of human immunodeficiency virus (HIV) continues to increase,[1,2] family physicians are encountering more patients at risk for this disease. It is imperative to diagnose patients as early as possible because advances in antiretroviral therapy are resulting in impressive extensions of life span and increased quality of life,[1-3] and because of the need to break the cycle of ongoing infections through preventive behavior changes.[4,5] Family physicians need to be current and comfortable in their approach to patients at risk for and those infected with HIV. The management of advanced acquired immunodeficiency syndrome (AIDS), opportunistic infections, and antiretroviral therapy is complex and requires additional training and expertise. However, the initial evaluation and preventive care of patients with HIV is straightforward[6,7] and within the scope of family physicians.

Issues For Patients Newly Diagnosed with HIV

PSYCHOSOCIAL STABILIZATION

As with any potentially life-threatening illness (especially HIV, which can be associated with social stigma), coping should be the first issue addressed.[4,8,9] Family physicians are trained in psychosocial and community medicine, and therefore are able to address patients' safety; support systems; potential depression and suicide risk; family reactions such as blame and domestic violence; and potential impact on employment, finances, and health insurance resources. Knowledge of local legal regulations and community resources is important, and physicians should be prepared to provide appropriate referrals to counselors; social workers; financial and insurance assistance programs; and housing, drug treatment, and legal resources.

TRANSMISSION PREVENTION

Diagnosing a new case of HIV infection presents a unique opportunity to interrupt the cycle of HIV spread.[4,5] Despite physicians' knowledge and education about HIV transmission, the annual number of new HIV infections has not declined over the past decade.[1,2,4,10] In 2002, there were more than 40,000 new HIV infections in the United States, one half of them occurring in people younger than 25 years. Among women, the

SORT: KEY RECOMMENDATIONS FOR PRACTICE

Clinical recommendation	*Evidence rating*	*References*
Patients with HIV should be monitored for $CD4^+$ lymphocyte and HIV RNA levels every three to six months.	C	7, 8, 26, 28
Patients who are hepatitis A or B nonimmune at baseline should be vaccinated.	B	7, 8, 25
Tuberculosis prophylaxis should be given to patients with any of the following: history or symptoms of tuberculosis, a PPD of at least 5 mm, or a possible false-negative PPD.	C	7, 8, 25
Pneumocystis jiroveci prophylaxis with trimethoprim/sulfamethoxazole (Bactrim, Septra) should be initiated at $CD4^+$ counts of less than 200 cells per mm^3.	A	7, 8, 25
Women with HIV should have Pap smears every six months for the first year and, if normal, annual Pap smears thereafter.	C	7, 8, 25
High-risk patients with ongoing exposure should be checked annually for gonorrhea, chlamydia, syphilis, and hepatitis C.	C	7, 8, 25
Antibiotic prophylaxis should be used to prevent toxoplasmosis and *Mycobacterium avium-intracellulare* complex infection at $CD4^+$ cell counts below 100 and below 50 cells per mm^3, respectively.	B	7, 8, 25

HIV = human immunodeficiency virus; PPD = purified protein derivative.

A = consistent, good-quality patient-oriented evidence; B = inconsistent or limited-quality patient-oriented evidence; C = consensus, disease-oriented evidence, usual practice, expert opinion, or case series. For information about the SORT evidence rating system, see page 196 or http://www.aafp.org/afpsort.xml.

majority of cases are attributable to heterosexual contact. Thus, enhanced effort in preventing HIV transmission, among infected and uninfected persons, is crucial.

The most important prevention approach is education and behavior modification. The Centers for Disease Control and Prevention's (CDC's) revised guidelines[4,11,12] on the prevention of HIV emphasize behavioral intervention strategies that focus on interpersonal prevention skills rather than just patient knowledge. Key points include screening patients with HIV for ongoing or recurring risk behaviors, discussing sexual activities and drug use, positively reinforcing incremental changes toward safer behavior, and addressing how to disclose HIV-seropositive status to a sex or drug partner.[12]

The safest sexual practices are abstinence followed by monogamy. For patients who are neither abstinent nor monogamous, the physician should convey the following infection prevention messages: consistent and correct condom use; sex only while sober; reduced numbers of sex partners; and less mucosal trauma. For patients who use intravenous drugs, physicians should recommend cessation of illicit drug use or, if this is unlikely, using bleached or new needles and not sharing needles.

Other approaches to the prevention of HIV transmission include interruption of maternal-child transmission through prenatal HIV testing and antiretroviral therapy for mother and newborn,[5,13] reduction of HIV sexual transmission through antiretroviral therapy to reduce viral concentration in genital secretions,[14] and treatment of other sexually transmitted diseases (STDs) to mitigate the enhancement of HIV transmission that otherwise occurs in this context.[15] Numerous studies[13-17] have reported decreased rates of sexual and perinatal transmission among persons with lower levels of plasma viremia, including those undergoing antiretroviral therapy.[14] However, other studies[18-20] have documented an imperfect correlation between serum viremia and viral levels in sexual secretions, finding that an undetectable serum viral load does not guarantee the safety of unprotected sex.

The increased risk of HIV transmission due to elevated HIV viral concentrations in genital tract secretions during acute HIV infection[21] and episodes of STDs underscores the importance of early HIV detection and screening and counseling for all STDs in the context of sexually transmitted infections or risk factors.[22]

Prevention approaches that are highly attractive from a pandemic perspective are topical microbicides and HIV vaccination. Unfortunately, research to date has produced no viable candidates, relegating these modalities to future hopes. Lastly, although HIV is not casually transmitted, patients in the household setting should be advised to clean visible blood spills or soiled garments with a bleach solution and not to share toothbrushes or razors with anyone. No other specific precautions are necessary.

PARTNER NOTIFICATION AND CASE REPORTING

The goals of partner notification and HIV testing are to interrupt the cycle of repeated HIV exposure and to detect other cases of HIV infection to facilitate entry into medical care. Providers need to be familiar with local public health statutes concerning partner notification and patient confidentiality, because these vary among states. When providing testing of contacts, attention must be paid to the likely timing of potential exposures because seroconversion typically occurs subsequent (and consequent) to the initial period of acute infection viremia. Thus, during the first three months after HIV exposure, early detection may require testing of HIV RNA levels confirmed by repeat serologic testing.[4,6,7,9,23]

The reporting of cases of HIV or AIDS is an important public health requirement, especially because in most states these figures determine the distribution of federal Ryan White AIDS CARE Act funds or Medicaid funds for the care of uninsured patients.[9,24] Information regarding requirements and procedures for reporting cases of HIV or AIDS can be obtained through local public health departments.

Baseline Medical Evaluations

The main goals of baseline evaluation are to: (1) assess the risk of HIV disease progression to determine the need for antiretroviral therapy; (2) assess the risk for opportunistic complications, to guide prevention education and prophylaxis; (3) evaluate current symptoms based on HIV stage; (4) screen for common infectious and noninfectious comorbidities related to HIV infection; and (5) target appropriate health maintenance interventions.

HISTORY AND PHYSICAL EXAMINATION

High-risk sexual activity and drug use increases the risk of HIV transmission and may have direct health risks for patients infected with HIV. It is recommended that physicians regularly ask their patients about such behaviors; published guidelines and questionnaires are available to guide physicians in having these discussions.[7,8,12] Physicians also should evaluate patients for the signs and symptoms of high-risk activities, such as manifestations of genital and systemic STDs.[22]

Other important evaluations concern detection of HIV-related disease manifestations.[7,8] Common early manifestations include fever and sweats, weight loss, generalized lymphadenopathy, recurrent vaginal candidiasis, recurrent oral ulcers, onychomycosis, seborrhea, and shingles *(Table 1[6,7,25])*. There are also many comorbid conditions common to patients with HIV that should be evaluated, such as tuberculosis and hepatitis B and C.

TABLE 1
Disease Conditions Associated with Stages of Immunodeficiency

Stage of immunodeficiency	*Type of condition*	*Conditions*	*AIDS defining?*
Symptomatic HIV ($CD4^+$ cell count less than 500 cells per mm^3 [500×10^9 per L])	Superficial fungal infections	Thrush, recurrent vaginal candidiasis, onychomycosis, seborrhea	No
	Superficial viral infections	Shingles, oral hairy leukoplakia, recurrent oral ulcers	No
	Laboratory abnormalities	Thrombocytopenia, neutropenia, hypergammaglobulinemia	No
	Constitutional symptoms	Night sweats, fever, fatigue, generalized lymphadenopathy	No
AIDS ($CD4^+$ cell count less than 200 cells per mm^3 [200×10^9 per L])	Opportunistic infections	*Pneumocystis jiroveci* pneumonia, candida esophagitis, cryptococcal infections, *Isospora belli* diarrhea, prolonged herpes simplex ulcers	Yes
	Opportunistic malignancies	Lymphoma, Kaposi's sarcoma	Yes
Advanced AIDS ($CD4^+$ cell count less than 50 cells per mm^3 [50×10^9 per L])	Opportunistic infections	Disseminated *Mycobacterium avium-intracellulare* complex, cytomegalovirus infections, toxoplasmosis	Yes
	Other advanced AIDS conditions	AIDS wasting syndrome, AIDS dementia complex	Yes

AIDS = acquired immunodeficiency syndrome; HIV = human immunodeficiency virus.

Information from references 6, 7, and 25.

A more detailed review of HIV-related manifestations (including those that occur at more advanced stages of HIV disease) and the implications of antiretroviral therapy (e.g., drug interactions and effects on non-HIV-related conditions such as diabetes and hyperlipidemia) and other therapies (e.g., methadone, herbal remedies) is provided in the following sections and in referenced resources.[7,8,26-28]

LABORATORY TESTS

When patients are first identified as HIV seropositive, there are numerous baseline laboratory evaluations that should be performed. As listed in *Table 2*,[7,8,25,26] the first category of tests is to assess patients' risk for HIV disease progression and opportunistic complications as determined by $CD4^+$ T-lymphocyte cell counts, which decline at a rate that is affected by plasma HIV RNA levels (viral load).[25,29] In addition, baseline is the best time to perform an HIV-1 genotype test to determine whether the patient is infected with a drug-resistant virus.[26]

$CD4^+$ T-lymphocyte cell counts are obtained by ordering a complete blood count, along with a CD4 and CD8 lymphocyte subset analysis. *Table 1*[6,7,25] lists the correlations between HIV disease stages, $CD4^+$ cell counts, and common clinical manifestations associated with each stage.[25,30] Knowledge of a patient's $CD4^+$ T-lymphocyte levels can help focus the clinical evaluation of presenting symptoms. For example, a dry cough at high-normal $CD4^+$ T-lymphocyte levels would be less consistent with AIDS-related *Pneumocystis jiroveci* pneumonia (formerly known as *Pneumocystis carinii* pneumonia) than if the same presentation were to occur at $CD4^+$ T-lymphocyte cell count levels of less than 200 cells per mm^3 (200×10^9 per L).

A normal $CD4^+$ cell count is roughly 1,000 cells per mm^3 ($1{,}000 \times 10^9$ per L). Early symptoms may begin when $CD4^+$ T-lymphocyte cell count levels drop below 500 cells per mm^3 (500×10^9 per L). AIDS-related opportunistic manifestations usually do not occur until $CD4^+$ counts are below 200 cells per mm^3, with a subset of more serious complications at $CD4^+$ cell counts below 50 cells per mm^3 (50×10^9 per L). However, it is common for patients to remain asymptomatic (or unaware of mild symptoms) even with $CD4^+$ cell counts below 200 cells per mm^3. In addition, although $CD4^+$ cell counts typically decline at a rate of 50 to 100 cells per year following infection, as many as 30 percent of patients may progress at faster or slower rates. Thus, whereas an initial $CD4^+$ cell count of 700 to 800 cells per mm^3 (700 to 800×10^9 per L) might be reassuring of early or mild disease, T-lymphocyte cell counts should be reassessed every three to six months to monitor disease progression.

Tests approved by the U.S. Food and Drug Administration for HIV RNA include: the Amplicor HIV-1 Monitor test by Roche Diagnostics (PCR), the Versant branched-DNA (bDNA) assay distributed by Chiron Corp., and the NucliSens HIV-1 RNA nucleic acid amplification test by Organon Teknika. A repeat viral load test conducted one to two weeks after the initial test generally is recommended (unless waiting for the repeat test would delay intervention in a patient with advanced HIV) because of normal test variability (up to threefold differences) and to detect false elevations caused by recent illness or vaccination. Thereafter, serum viral load tests typically are monitored every four to six months.[26]

The interpretations of plasma viral load and $CD4^+$ tests are based on numerous studies[7,8,26-29] of the natural history of disease progression and the effectiveness of antiretroviral agents. In general, the higher the viral load, the more active and aggressive the HIV infection, resulting in a more rapid decline in $CD4^+$ cell counts and quicker progression to AIDS or death. Regardless of viral load, the $CD4^+$ level is the determining factor for a patient's risk of opportunistic complications, although both are independent predictors of risk of AIDS.[29] Thus, low viral load levels (i.e., below 10,000 copies per mL or, ideally, undetectable at the ultra-sensitive level) or high $CD4^+$ cell counts (i.e., above 200 cells per mm^3 and, ideally, above 500 cells per mm^3) are associated with a better prognosis and are the basis for and outcome goals of antiretroviral therapy.

INFECTION SCREENING TESTS

Patients infected with HIV often are coinfected with other pathogens related to the route of transmission or to psychosocial circumstances. Thus, broad-spectrum screening for these pathogens at baseline and periodically is an integral part of the care of patients with HIV.[7,8,22,25] *Table 2*[7,8,25,26] lists the relevant screening tests to consider. *Table 3*[25] lists the definitions of the CDC's evidence ratings system.

The first screening category is for pathogens that are preventable through vaccination, namely hepatitis A and B. The second category is for infections to which patients may have repeated exposure through unsafe sexual practices or illicit drug use. These include syphilis, chlamydia, gonorrhea, and hepatitis C. Note that management of hepatitis B and C in patients with HIV is critically important because it can affect patient longevity (directly, by counteracting progressive liver disease; or indirectly, by protecting a patient's liver against the side effects of antiretroviral medications).[31] In patients who are immunodeficient, it is not uncommon for

TABLE 2

Baseline and Periodic Testing in Patients with HIV

Indication	*Condition*	*Test*	*Purpose*
All patients (every three to six months)	HIV	$CD4^+$ T-lymphocyte count	HIV disease staging and opportunistic infection risk assessment
	HIV	HIV RNA level	HIV disease activity
Baseline (before antiretroviral treatment)	HIV	HIV-1 genotype	Antiretroviral treatment resistance
Baseline (before vaccination)	HBV	HBsAg and core antibody, or surface antibody titer if previously vaccinated	Vaccination if negative or nonimmune
		HBV e-antigen and HBV DNA if HBsAg-positive	HBV treatment if active infection
	HAV	HAV total antibodies	Vaccination, especially if infected with HCV or HBV
Annually (if ongoing exposure risk)	Syphilis	Rapid plasma reagin or VDRL	Treatment of primary, secondary, or tertiary disease
	Gonorrhea and chlamydia	Gonorrhea and chlamydia culture*; immunofluorescence; DNA amplification	Treatment of sexually transmitted diseases
	HCV	Anti-HCV enzyme immunoassay (BIII), confirm with RIBA or HCV RNA (CIII); HCV RNA if antibody negative but transaminases elevated	HCV preventive education and treatment; also for HAV and HBV vaccination
Annually	Tuberculosis	PPD skin test by administration of intermediate strength (5-TU) [AI]	Tuberculosis prophylaxis or treatment
		Chest radiograph [AII]	If positive PPD, possible false-negative PPD, history of tuberculosis, or symptomatic
	Human papillomavirus-associated dysplasia	Pap smear†	Screening/ treatment
Baseline (depending upon patient history)	Toxoplasmosis	Toxoplasma IgG‡ [BIII]	Preventive education if negative [BIII]; prophylaxis if toxoplasma IgG+ and $CD4^+$ less than 100 cells per mm^3 (100×10^9 per L) [AII]
	CMV	CMV IgG	If low-risk group (neither men who have sex with men nor injection drug use); for preventive education; before blood transfusion (white blood cell–depleted blood if CMV-negative)
	VZV	VZV IgG	For prophylaxis if potential VZV exposure and negative IgG [AIII]
Only if advanced AIDS ($CD4^+$ less than 50 to 100 cells per mm^3 [50 to 100 $\times$ 10^9 per L])	*Mycobacterium avium-intracellulare* complex	Acid fast bacteria blood culture	Before initiation of prophylaxis if symptomatic and $CD4^+$ less than 100 cells per mm^3
	CMV	Dilated funduscopic examination (every three to six months)	Screening for CMV retinitis (usually at $CD4^+$ counts less than 100 cells per mm^3)
Baseline and periodically	Noninfectious comorbidities	Complete metabolic panel	Liver and kidney disease, malnutrition, hypergammaglobulinemia
		Complete blood count	Cytopenias
		Urinalysis	Nephropathy

NOTE: *Not all test recommendations were rated. See Table 3 for definitions of the Centers for Disease Control and Prevention's evidence ratings system.*

HIV = human immunodeficiency virus; HBV = hepatitis B virus; HBsAg = hepatitis B surface antigen; HAV = hepatitis A virus; HCV = hepatitis C virus; VDRL = Venereal Disease Research Laboratory; RIBA = recombinant immunoblot assay; PPD = purified protein derivative; IgG = immunoglobulin G; CMV = cytomegalovirus; VZV = varicella zoster virus.

**—Gonorrhea and chlamydia tests should be performed on specimens from all body areas involved in sexual activities (e.g. cervical, anal, oral, urethral [urine]).*

†—Following diagnosis and treatment of dysplasia, repeat Pap every four to six months for the first two years in women, annually thereafter if normal; consider anal Pap smear in women with any genital human papillomavirus disease (regardless of history of anal sex) and in men who have sex with men (history of receptive anal sex).

‡—Repeat IgG levels when $CD4^+$ declines below 100 cells per mm^3 if baseline results negative.

Information from references 7, 8, 25, and 26.

hepatitis C infections to be seronegative; therefore, it is important to check serum HCV RNA levels if serum alanine transaminase levels are elevated.

The third category is screening for recurrence of previous or newly acquired infections, such as *Mycobacterium tuberculosis* and human papillomavirus (HPV). Tuberculosis is intertwined with the AIDS epidemic, with each infection exacerbating and commonly coexisting with the other. The standard public health approach is to screen for coinfection whenever either infection is detected.

When screening for tuberculosis in patients with HIV, the tuberculin skin test generally is considered positive at an induration of at least 5 mm. In addition, routine chest radiograph examination often is needed for patients with a negative tuberculin skin test given the increased possibility of anergy, particularly at lower $CD4^+$ cell counts (although anergy skin testing is not recommended by the CDC because of a lack of effectiveness).[25,32] Lastly, even in patients with HIV whose skin test and chest radiograph screening results are negative, prophylaxis may be indicated based solely on a history of high exposure risk.

HPV is more aggressive in patients with HIV and tends to be more prevalent, persistent, and recurrent, and progresses more rapidly to HPV-related dysplasia. Thus, increased vigilance in screening is indicated in patients with HIV, including cervical Papanicolaou (Pap) smears performed every six months for the first year and annually thereafter, if normal.

The fourth category of screening is for opportunistic infections unique to patients who are immunodeficient.[25] Infections in this category include cytomegalovirus, toxoplasmosis, and varicella zoster virus. For opportunistic infections, there are two relevant timing considerations in patients with HIV. First, baseline evaluations are needed for all patients, regardless of $CD4^+$ cell count level, with education on how to limit pathogen exposure and thereby reduce the risk for subsequent reactivation of such infections. Second, all patients whose immunodeficiency is in the AIDS range (i.e., $CD4^+$ cell count less than 200 cells per mm^3) should be screened for previous pathogen exposure (e.g., toxoplasmosis), or current symptoms (e.g., fever and anemia of *Mycobacterium avium-intracellulare*) because these will affect initiation of prophylaxis. In addition, baseline knowledge about previous occurrence of chickenpox or activities with high risk for cytomegalovirus exposure (e.g., men who have sex with men) also guide preventive interventions.

The outcome goal of screening for coinfections is not only to direct the provision of prophylactic therapies but to guide patients in ways of minimizing exposure to potential opportunistic pathogens. *Table 4*[25] lists the basic areas of patient education relevant to preventing infections associated with HIV.

TABLE 3
Definitions of the Centers for Disease Control and Prevention's Evidence Ratings System

Rating	*Strength of recommendation*
A	Both strong evidence for efficacy and substantial clinical benefit support recommendation for use; should always be offered.
B	Moderate evidence for efficacy or strong evidence for efficacy, but only limited clinical benefit, supports recommendation for use; should usually be offered.
C	Evidence for efficacy is insufficient to support a recommendation for or against use, or evidence for efficacy might not outweigh adverse consequences (e.g., drug toxicity, drug interactions) or cost of the chemoprophylaxis or alternative approaches; use is optional.
D	Moderate evidence for lack of efficacy or for adverse outcome supports a recommendation against use; should usually not be offered.
E	Good evidence for lack of efficacy or for adverse outcome supports a recommendation against use; should never be offered.
Rating	*Quality of evidence supporting the recommendation*
I	Evidence from at least one correctly randomized, controlled trial
II	Evidence from at least one well-designed clinical trial without randomization, from cohort or case-control analytic study (preferably from more than one center), or from multiple time-series studies, or dramatic results from uncontrolled experiments
III	Evidence from opinions of respected authorities based on clinical experience, descriptive studies, or reports of consulting committees

Adapted from Kaplan JE, Masur H, Holmes KK; USPHS; Infectious Diseases Society of America. Guidelines for preventing opportunistic infections among HIV-infected persons—2002. Recommendations of the U.S. Public Health Service and the Infectious Diseases Society of America. MMWR Recomm Rep 2002;51(RR-8):35.

TESTS FOR NONINFECTIOUS COMORBIDITIES

There are many laboratory abnormalities commonly seen in patients with HIV,[7,8] including: anemia (caused by chronic disease, malnutrition, or quiescent mycobacterium

TABLE 4
Patient Education to Prevent Infections Associated with HIV

Type of exposure	*Potential pathogens*	*Patient education*
Sexual	Drug-resistant HIV; CMV; Kaposi's sarcoma; herpes virus (human herpes virus-8); cryptosporidium; enteric pathogens; others	Use barriers with penetrative sex (male condoms [AII]; female condoms [BIII]). Avoid oral-to-anal sexual contact [BIII].
Blood	Hepatitis B and C viruses	Use blood-borne precautions with injection drug use, drug snorting, tattooing, and body piercing.
Enteric	Hepatitis A; salmonella; cryptosporidium; others	Use standard food-borne illness precautions (e.g., no raw eggs or fish, use pasteurized juices and dairy products, avoid contaminated water, use standard travel food precautions).
Environmental, occupational, and pet-related	Tuberculosis; CMV; varicella; cryptococcus; *Toxoplasma gondii*; cryptosporidium; campylobacter; salmonella; bartonella; others	Use caution with occupational activities (e.g., working in prisons, day care facilities, and homeless shelters). Avoid exposure to bat droppings and dust storms. Avoid exposure to ill animals and to cat excrement.
Travel	All of the above, plus regional endemic infections (e.g., polio)	Precautions above, plus CDC guidelines for travelers with attention to differences for immunodeficient persons (e.g., those in whom live vaccines are contraindicated)

NOTE: *Only general recommendations and typical pathogens and prevention guidelines are listed. See Table 3 for definitions of the CDC's evidence ratings system.*

HIV= human immunodeficiency virus; CMV = cytomegalovirus; CDC= Centers for Disease Control and Prevention.

Information from reference 25.

infection); thrombocytopenia (related to untreated HIV or to chronic liver disease); leukopenia and lymphopenia (reflective of immunosuppression); hypergammaglobulinemia (caused by overall dysregulation of the immune system); hypoalbuminemia (caused by malnutrition or liver disease); transaminitis (caused by viral hepatitis); and proteinuria (caused by HIV-associated nephropathy, most often in blacks). Patients who are diagnosed later in the course of their infection may also have complications related to HIV that may be initially detected through routine chemistry evaluations (e.g., lymphoma with an elevated lactate dehydrogenase, *M. avium-intracellulare* complex with an elevated serum alkaline phosphatase).

Patients with HIV also have typical health care needs beyond conditions related to HIV.[7,8] These include the need for routine, age-appropriate health-maintenance screening for cardiovascular health and for cancer (e.g., breast, prostate, colorectal). In addition, as patients with HIV age they may become afflicted with obesity, hypertension, insulin resistance, diabetes, hyperlipidemia, or atherosclerotic disease. Any of these may be a consequence of the antiretroviral therapies or of aging itself. Thus, extra preventive focus at baseline is increasingly important for these patients.

Baseline Therapies

Initial therapy in patients newly diagnosed with HIV follows from the goals and results of baseline evaluation: (1) health maintenance interventions, (2) opportunistic infection prophylaxis, and (3) antiretroviral therapy.

HEALTH MAINTENANCE

One component of health maintenance in patients with HIV is routine vaccinations such as for tetanus and diphtheria.[7,8,25] However, there are several special considerations pertinent to these patients. First, live viral vaccinations (e.g., smallpox, oral polio vaccine) pose an actual risk of infection consequent to the vaccines and are therefore contraindicated in patients with HIV and their household contacts. Second, because of immunodeficiency, patients with HIV are in the high-risk group targeted to receive immunization against pneumococcus and influenza. However, patients initially vaccinated at low $CD4^+$ cell count levels often have a blunted immune response to the pneumococcal vaccine and thus generally should be revaccinated when their $CD4^+$ cell counts rise above 200 cells per mm^3. In addition, vaccination against hepatitis A and B also is important for patients with HIV, with post-vaccination serology to assess immune response.

TABLE 5
Prophylaxis of Infections Associated with HIV

Infection	*Intervention*	*Indication*
Hepatitis B virus (HBV)	HBV vaccination [BII]	Hepatitis B negative
Hepatitis A virus (HAV)	HAV vaccination [BII]	Coinfected with HBV or hepatitis C virus, or high-risk exposures
Streptococcus pneumoniae	Pneumococcal vaccination (23-valent polysaccharide)	$CD4^+$ cell count greater than 200 cells per mm^3 (200×10^9 per L) [BII]
		$CD4^+$ cell count less than 200 cells per mm^3 [CIII]
Influenza	Inactivated vaccine	Annually
Pneumocystis jiroveci pneumonia	Trimethoprim/sulfamethoxazole (TMP-SMX; Bactrim, Septra) [AI]	$CD4^+$ cell count less than 200 cells per mm^3 [AI], or $CD4^+$ cell count less than 14 percent or history of AIDS diagnosis [BII], or history of oral thrush [AII]
Toxoplasmosis	TMP-SMX [AII]	$CD4^+$ cell count less than 100 cells per mm^3 (100×10^9 per L) and toxoplasma IgG+ [AII]
Mycobacterium avium-intracellulare complex	Azithromycin (Zithromax) [AI] or clarithromycin (Biaxin) [AI]	$CD4^+$ cell count less than 50 cells per mm^3 (50×10^9 per L) [AI]
Tuberculosis	Isoniazid (INH) [AII]	As per text.

NOTE: *Only first-line regimens are listed. See published guidelines for details. See Table 3 for definitions of Centers for Disease Control and Prevention's evidence ratings system.*

HIV = human immunodeficiency virus; AIDS = acquired immunodeficiency syndrome; IgG = immunoglobulin G.

Information from references 2, 6, 7, 25, and 27.

INSTITUTION OF OPPORTUNISTIC INFECTION PREVENTION

Table 5[2,6,7,25,27] lists the CDC's recommended prophylaxis guidelines and their indications. The most important prophylaxis is for *P. jiroveci* pneumonia, because the incidence rate approaches 80 percent in the absence of prophylaxis at $CD4^+$ cell count levels below 200 cells per mm^3, and its preventability is above 90 percent. Even pending the results of baseline T-lymphocyte cell counts and viral load, the presence of oral thrush or herpes ulcers for more than four weeks indicates sufficient immunodeficiency to warrant *P. jiroveci* pneumonia prophylaxis, which may save the patient an unnecessary bout with the most common opportunistic infection related to HIV.

ANTIRETROVIRAL THERAPY

Even if patients are referred to an outside consultant, it is important for family physicians to be aware of the indications for initiation of antiretroviral therapy. The overall goal of antiretroviral therapy is to convert HIV infection into a chronic disease by suppressing viral replication to arrest or revert immunodeficiency progression and prevent opportunistic complications. With this goal in mind, therapy is desirable for patients who have or are near to having AIDS, based on symptomatology or $CD4^+$ cell counts. In addition, there are some proponents of antiretroviral treatment during acute (primary) HIV infection for the purpose of limiting viral dissemination and disease progression[23]; however, more recent studies[33] have shown that these benefits are lost after discontinuation of therapy, thus necessitating lifelong therapy after such early initiation.

Several guidelines[26-28] for antiretroviral therapy concur that treatment is indicated for patients who are symptomatic (e.g., have thrush, fevers, thrombocytopenia, or wasting); have AIDS ($CD4^+$ cell counts of less than 200 cells per mm^3 or AIDS-defining conditions); or who are pregnant (to prevent perinatal transmission). The controversy among the guidelines revolves around the appropriate $CD4^+$ cell count or HIV RNA levels at which to initiate therapy in asymptomatic pre-AIDS patients. Depending upon the amount of "pre-AIDS buffer zone" desired, antiretroviral therapy can be initiated later, when $CD4^+$ cell counts are nearing the AIDS level of 200 cells per mm^3; or sooner, when $CD4^+$ cell counts are below 350 cells per mm^3 (350×10^9 per L). The later therapy is initiated, the greater the risks of opportunistic complications, potential suboptimal immune restoration, and medication toxicity. Conversely, the earlier antiretroviral therapy is initiated, the longer the duration of therapy and the greater the risk of medication-related long-term side effects (e.g., lipo-

dystrophy, hyperlipidemia, and insulin resistance)[34] and the development of viral-resistant mutations through imperfect medication adherence. Regardless of the disease stage or need for therapy, a patient's readiness, willingness, and ability to adhere to therapy are key prerequisites for treatment success.[26]

Antiretroviral therapy requires expertise to deal with these complex issues and to keep up with the changing treatment guidelines and new research data. Accordingly, treatment by "HIV experts" is the national standard. Although some family physicians have the additional training and experience necessary to become HIV experts, referral to HIV subspecialists often is necessary. Verification of provider expertise can be assessed in reference to national HIV-expert criteria.[35,36] General family physicians, however, still have an important role in the care of patients with HIV. Early diagnosis and counseling, ongoing prevention emphasis, screening and provision of continuity health maintenance, and reinforcement of the importance of medication adherence are all important contributions that family physicians can provide.

Members of various family medicine departments develop articles for "Problem-Oriented Diagnosis." This is one in a series from the Department of Family Medicine at the University of Southern California, Los Angeles, Calif. Coordinator of the series is Ricardo G. Hahn, M.D.

The Author

ANN M. KHALSA, M.D., M.S.ED., is associate medical director for the La Fe C.A.R.E. HIV/AIDS Center and the director of human immunodeficiency virus (HIV) training under the federal AIDS Education and Training Center at the La Fe Center in El Paso, Tex. She also is a clinical faculty member at the Texas Tech University Health Sciences Center School of Medicine, El Paso. Dr. Khalsa received her medical degree and master of medical education degree from the University of Southern California, Los Angeles.

Address correspondence to Ann M. Khalsa, M.D., M.S.Ed., La Fe C.A.R.E. HIV/AIDS Center, 1505 Mescalero Dr., El Paso, TX 79925-2019. Reprints are not available from the author.

Author disclosure: Nothing to disclose.

REFERENCES

1. Centers for Disease Control and Prevention. Cases of HIV Infection and AIDS in the United States, 2003. HIV/AIDS Surveillance Report, March 14, 2005. Accessed online July 15, 2005, at: http://www.cdc.gov/hiv/stats/hasrlink.htm.
2. Centers for Disease Control and Prevention. AIDS surveillance—general epidemiology L178 slide series (through 2003). Accessed online July 15, 2005, at: http://www.cdc.gov/hiv/graphics/surveill.htm.
3. Palella FJ Jr, Delaney KM, Moorman AC, Loveless MO, Fuhrer J, Satten GA, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. N Engl J Med 1998;338:853-60.
4. Gallant JE. HIV counseling, testing and referral. Am Fam Physician 2004;70:295-302.
5. Goldschmidt RH, Poage RE. Preventing HIV–a primary care imperative. [Editorial] Am Fam Physician 2004;70:246, 248.
6. Weintrob AC, Giner J, Menezes P, Patrick E, Benjamin DK Jr, Lennox J, et al. Infrequent diagnosis of primary human immunodeficiency virus infection: missed opportunities in acute care settings. Arch Intern Med 2003;163:2097-100.
7. Aberg JA, Gallant JE, Anderson J, Oleske JM, Libman H, Currier JS, et al, for the HIV Medicine Association of the Infectious Diseases Society of America. Primary care guidelines for the management of persons infected with human immunodeficiency virus: recommendations of the HIV Medicine Association of the Infectious Diseases Society of America. Clin Infect Dis 2004;39:609-29.
8. New York State Department of Health AIDS Institute. Primary Care Approach to the HIV-Infected Patient. March 2004. Accessed online July 15, 2005, at: http://www.hivguidelines.org./public_html/a-primca/a-primca.htm.
9. Centers for Disease Control and Prevention. Revised guidelines for HIV counseling, testing, and referral. MMWR Recomm Rep 2001;50 (RR-19):1-57.
10. Fauci A. Emerging and re-emerging infectious diseases: the perpetual challenge to global health. Presented at the 42nd annual meeting of the Infectious Diseases Society of America, Boston, September 30-October 3, 2004. Accessed online July 15, 2005, at: http://www.idsociety.org/Template.cfm?Section=Program&CONTENTID=10150&TEMPLATE=/ContentManagement/ContentDisplay.cfm.
11. Centers for Disease Control and Prevention. HIV prevention strategic plan through 2005. January 2001. Accessed online July 15, 2005, at: http://www.cdc.gov/nchstp/od/hiv_plan/default.htm.
12. Centers for Disease Control and Prevention. Incorporating HIV prevention into the medical care of persons living with HIV. Recommendations of the CDC, the Health Resources and Services Administration, the National Institutes of Health, and the HIV Medicine Association of the Infectious Diseases Society of America. MMWR Recomm Rep 2003;52(RR-12):1-24. Accessed online July 15, 2005, at: http://www.cdc.gov/mmwr/PDF/rr/rr5212.pdf .
13. Bryson YJ. Perinatal HIV-1 transmission: recent advances and therapeutic interventions. AIDS 1996;10(suppl 3):S33-42.
14. Cohen MS. Conference report: HAART and prevention of HIV transmission. Atlanta, June 6-7, 2002. Medscape. Accessed online July 15, 2005, at: http://www.medscape.com/viewarticle/437545.
15. Pilcher CD. Acute HIV in STD clinics: detection of co-transmission of pathogens. Presented at the 42nd annual meeting of the Infectious Diseases Society of America, Boston, September 30-October 3, 2004. Accessed online July 15, 2005, at: http://www.idsociety.org/Template.cfm?Section=Program&CONTENTID=10150&TEMPLATE=/ContentManagement/ContentDisplay.cfm.
16. Quinn TC, Wawer MJ, Sewankambo N, Serwadda D, Li C, Wabwire-Mangen F, et al. Viral load and heterosexual transmission of human immunodeficiency virus type 1. Rakai Project Study Group. N Engl J Med 2000;342:921-9.
17. Pedraza MA, del Romero J, Roldan F, Garcia S, Ayerbe MC, Noreiga AR, et al. Heterosexual transmission of HIV-1 is associated with high plasma viral load levels and a positive viral isolation in the infected partner. J Acquir Immune Defic Syndr 1999;21:120-5.
18. Taylor S, Sadiq T, Sabin C, White D, Cane P, Drake S, et al. Seminal super shedding of HIV: implications for sexual transmission. Presented at the 10th Conference on Retroviruses and Opportunistic Infections, Boston, February 10-14, 2003. Accessed online July 15, 2005, at: http://www.retroconference.org/2003/cd/Abstract/454.htm.
19. Lampinen TM, Critchlow CW, Kuypers JM, Hurt CS, Nelson PJ, Hawes SE, et al. Association of antiretroviral therapy with detection of HIV-1 RNA and DNA in the anorectal mucosa of homosexual men. AIDS 2000;14:F69-75.

20. Kovacs A, Wasserman SS, Burns D, Wright DJ, Cohn J, Landay A, et al. Determinants of HIV-1 shedding in the genital tract of women [published correction appears in Lancet 2002;359:630]. Lancet 2001;358:1593-601.
21. Pilcher CD, Tien HC, Eron JJ Jr, Vernazza PL, Leu SY, Stewart PW, et al. Brief but efficient: acute HIV infection and the sexual transmission of HIV. J Infect Dis 2004;189:1785-92.
22. Sexually transmitted diseases treatment guidelines 2002. Centers for Disease Control and Prevention. MMWR Recomm Rep 2002;51(RR-6):1-78. Accessed online July 15, 2005, at: http://www.cdc.gov/mmwr/PDF/RR/RR5106.pdf.
23. Kahn JO, Walker BD. Acute human immunodeficiency virus type 1 infection. N Engl J Med. 1998;339:33-9.
24. The Ryan White Comprehensive AIDS Resources Emergency (care) act. Accessed online July 15, 2005, at: http://www.hhs.gov/news/press/1998pres/981218d.html.
25. Kaplan JE, Masur H, Holmes KK; USPHS; Infectious Diseases Society of America. Guidelines for preventing opportunistic infections among HIV-infected persons—2002. Recommendations of the U.S. Public Health Service and the Infectious Diseases Society of America. MMWR Recomm Rep 2002;51(RR-8):1-52. Accesssed online July 15, 2005, at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5108a1.htm.
26. Panel on Clinical Practices for Treatment of HIV Infection, convened by the Department of Health and Human Services (DHHS). Guidelines for the use of antiretroviral agents in HIV-1 infected adults and adolescents. April 7, 2005. Accessed online October 6, 2005, at: http://aidsinfo.nih.gov/guidelines/adult/AA_100605.pdf.
27. Yeni PG, Hammer SM, Carpenter CC, Cooper DA, Fischl MA, Gatell JM, et al. Antiretroviral treatment for adult HIV infection in 2002: updated recommendations of the International AIDS Society-USA Panel. JAMA 2002;288:222-35.
28. New York State Department of Health AIDS Institute. Criteria for the medical care of adults with HIV infection. Antiretroviral therapy. Revised June 2005. Accessed online July 15, 2005, at: http://www.hivguidelines.org/public_html/a-arv/a-arv.pdf.
29. Mellors JW, Munoz A, Giorgi JV, Margolick JB, Tassoni CJ, Gupta P, et al. Plasma viral load and CD4+ lymphocytes as prognostic markers of HIV-1 infection. Ann Intern Med 1997;126:946-54.
30. 1993 revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR Recomm Rep 1992;41(RR-17):1-19.
31. Chung RT, McGovern BH. Hepatitis primer, including the HIV-infected patient. Accessed online July 15, 2005, at: http://www.idsociety.org/Template.cfm?Section=Program&CONTENTID=10150&TEMPLATE=/ContentManagement/ContentDisplay.cfm.
32. Targeted tuberculin testing and treatment of latent tuberculosis. American Thoracic Society MMWR Recomm Rep 2000;49(RR-6):1-51. Accessed online July 15, 2005, at: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr4906a1.htm.
33. Kaufmann D, Lichterfeld M, Altfeld M, Allen T, Johnston M, Lee P, et al. Limited durability of immune control following treated acute HIV infection. 11th Conference on Retroviruses and Opportunistic Infections, San Francisco, February 8-11, 2004. Accessed online July 15, 2005, at: http://www.retroconference.org/2004/cd/abstract/24.htm.
34. Lesho EP, Gey DC. Managing issues related to antiretroviral therapy. Am Fam Physician 2003;68:675-86.
35. The American Academy of HIV Medicine. Accessed online July 15, 2005, at: http://www.aahivm.org.
36. HIV Medicine Association. Accessed online July 15, 2005, at: http://www.hivma.org.