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Human Immunodeficiency Virus in the Pediatric and Adolescent Population: The Role of the Pediatric Emergency Provider

AIDS- and HIV-related infections have changed significantly over the last decade. Although the overall incidence has declined, young adults have shown an increase in AIDS, with 50% of all new HIV infections in this age group. Many of these new HIV infections are in patients who are "late presenters." These patients have received less care and are more likely to have unknowingly transmitted the infection. Routine screening identifies patients earlier, decreases the stigma associated with HIV testing, and increases the likelihood of future testing during risky behavior periods. The authors review the current role of the ED provider in identifying and managing patients with potential HIV.

— Ann M. Dietrich, MD, Editor

Case Scenarios

Case 1. A 17-year-old female presents to the emergency department (ED) with complaints of fever, sore throat, and a rash. She recently returned from North Carolina, where she went camping. The social history is significant for sexual activity with women and men without the use of condoms. What labs should the ED physician obtain? What is the diagnosis?

Case 2. A 14-year-old male honor student presents to the ED with complaints of fever and an "infectious mononucleosis-like" illness. Six months prior, he was seen by his primary doctor, at which time he had a negative rapid HIV antibody test. The patient continues to engage in sexual activity with multiple partners without the use of condoms. What labs should the ED physician obtain? What is the diagnosis?

Case 3. A 15-year-old male presents to the ED with complaints of dysphagia and an unintentional 20-pound weight loss over the past month. In the ED, ENT was consulted and bedside endoscopy was done. White esophageal

Executive Summary

- Maintain a high index of suspicion for adolescents who present with a viral syndrome and HIV risk factors.
- The CDC recommends routine, voluntary HIV screening of *all* adolescents aged 13 years and older regardless of risk in areas with high HIV prevalence.
- A 60-second rapid HIV test is available.
- HIV testing that is risk-based or "sexual history-based" has and will miss opportunities to diagnose and treat HIV infection early.
- Routine testing decreases stigma, allows acknowledgement of risky behavior, and increases the likelihood of repeat testing.
- High-risk patients who are not tested perceive themselves to be low risk.
- Refer patients with a positive rapid HIV antibody test to an HIV specialist for confirmatory tests and treatment.
- Identification and treatment of acute HIV reduces spread and community HIV viral load.

plaques were seen, and the patient was diagnosed with esophageal candidiasis. A review of the history elicited a previous viral-like illness. What labs should the ED physician obtain? What is the diagnosis?

Introduction

Human immunodeficiency virus (HIV) is a human retrovirus that infects cells of the immune system and produces an acquired immunodeficiency. HIV and acquired immunodeficiency syndrome (AIDS) continue to be leading causes of illness and death in the United States, with an estimated 1-1.2 million people living with this disease.[1-3] Patients aged 13-24 years are a new cohort of persons at risk. Twenty-five to fifty percent of all HIV-infected adolescents have not been tested and are unaware of their positive status. As a result, these patients are unable to benefit from care and are more likely to transmit the infection unknowingly.[2-5]

The AIDS epidemic has changed over the past one to two decades. Between the years 2000-2006, the incidence of AIDS has declined by 4%; however, the incidence has increased by 21% among youth aged 13-24 years.[6] One-half of all new HIV infections are in this age group.[2,4,7,8] Risk-based testing has not been effective. The incidence of HIV has remained stable, with 40,000-50,000 new infections per year.[1,3,6] Furthermore, 25% of new HIV infections are in "late presenters." Late presenters are patients who are diagnosed with AIDS within 12 months of their HIV diagnosis.[1] Targeted testing based on risk behaviors fails to identify a large number of patients with HIV. High-risk youth with no previous HIV testing have low self-perception of risk and are more likely to decline screening.[9] Routine screening identifies patients earlier, decreases the stigma associated with HIV testing,[3] and increases the likelihood of future testing during risky behavior periods.[8] Routine HIV screening in the pediatric ED has been the exception, not the rule. Data suggest that routine HIV screening in the ED would identify HIV-infected patients who use the ED as their medical home.[9,10]

In response to the HIV epidemic, the American Academy of Pediatrics (AAP) published a policy statement in 2001, and later reaffirmed it in 2005, recommending routine HIV screening for adolescents 16-18 years of age, at least once a year in all health care settings when the prevalence of HIV in the community is more than 0.1%. Additionally, HIV testing is also recommended for sexually active and high-risk teens in areas with lower community HIV prevalence.[2,4]

Much like the guidelines put forth by the AAP, the CDC in 2006 put forth recommendations for routine HIV screening in all persons aged 13-64 years in all health care settings, including the ED, except in populations with a prevalence of less than 1/1000. The CDC further specified that patients seeking treatment for sexually transmitted infections (STIs) should also be screened. Patients with STIs are 3 to 5 times more likely to acquire HIV.[11] In 1995, Wilson et al surveyed emergency medicine programs and found that only three out of 95 academic EDs routinely performed HIV testing on patients suspected for STIs.[11] The interplay between these two epidemics should be recognized. Repeat screening should be performed annually for high-risk patients, which include patients or their partners with more than one sexual partner, or who present with a viral syndrome and lymphadenopathy without rhinorrhea, or males who engage in sexual activity with other males. Screening should be voluntary and pretest counseling is not required. The consent should be incorporated into the general consent, and documentation should only be done if the patient declines the HIV test.[3]

The rationale for the change in recommendation takes into account multiple factors. First, patients with HIV visit health care providers years prior to diagnosis and are not tested for HIV. This is coupled with poor provider ability to identify patients with HIV risk factors.[3] In a retrospective study of 348 patients diagnosed with HIV, 31% visited a health care provider in the three years prior to diagnosis and were not offered an HIV test.[10] Second, the demographics of the HIV/AIDS epidemic have changed and the ability of risk-based testing to identify HIV patients has decreased.[3] Risk-based testing has

and will continue to miss patients with HIV. A prospective analysis of a community sample looking at HIV testing among at-risk teens and young adults found that routine HIV screening raises awareness of behavioral risk. Furthermore, the majority of patients who are aware of their HIV status reduce behaviors that might transmit HIV.[3,8,12] A meta-analysis showed the prevalence of unprotected intercourse with non-infected partners was 68% lower for persons aware of HIV status compared to persons with no formal diagnosis.[3,12]

Despite the recommendations put forth by the AAP and the CDC, a survey done in 2008 demonstrated that only 50% of EDs screen for HIV. This survey further showed that only half of the centers that screen had the ability to link patients to outpatient care, and only 13% had developed routine screening policies.[10] With improvements in rapid HIV testing, patients can be effectively screened in the ED setting in approximately 60 seconds. In 2011, Haines et al investigated adolescent attitudes and preferences toward rapid HIV testing and found that 80% of adolescents are likely to get tested if a rapid test is available. They also found that during testing, adolescents are educated on risk and are more likely to return for future testing.[7] Expanding on this idea, Walensky et al evaluated 8,187 patient preferences for a dedicated HIV tester compared to a provider tester in the ED. Dedicated testers screened 57% patients, compared to 27% patients screened by providers, with a small increase of 4% in acceptance of the test when offered by the provider.[13]

The success of HIV screening implementation depends on the commitment and attitude of the ED staff. Perceived barriers of a lack of resources when resources were available, time constraints, and linkage to care when pathways were in place were unfounded in a study done by Arbelaez et al. Understanding provider barriers at the institutional level can aid in the implementation of routine screening programs.[9]

The ED is the primary source of care for many patients. Rapid screening tests are available to detect HIV before the development of symptoms. The detection of HIV and the referral to outpatient care for the initiation of disease-modifying treatments should be the goal of the ED provider.

Virology

HIV, a member of the RNA retrovirus, contains within its envelope the enzyme reverse transcriptase, which processes its viral RNA genome into DNA. The transcribed structural, regulatory, and accessory genes are then incorporated into the host genome. HIV then uses the host machinery to produce new virions.

Transmission

HIV infection can be acquired through sexual, parenteral, and perinatal transmission. Sexual intercourse, especially when anal penetration is performed, carries the highest risk of infection. In addition to the route of transmission, the viral load of the patient should also be considered. Patients with high viral loads are more likely to transmit the virus when compared to patients with undetectable viral counts. Furthermore, communities where HIV is identified and treated have lower community viral loads than communities where HIV testing is not done and the patients are unaware of their positive status. The prevalence of HIV is directly related to the community viral load.

Risk Factors

Behavioral, socioeconomic, and biological risk factors are seen in adolescent youth. First, during the adolescent stage of development, the focus of the patient is on self, with limited insight into risks and consequences. Adolescents then engage in sexual behaviors that place them at an increased risk of acquiring HIV. Risk factors include, but are not limited to, sex at an early age, multiple sexual partners, lack of condom use, STIs, and illicit substance use. Second, socioeconomic factors play a role, and a link between poverty and HIV is prevalent. Finally, biologically, the exocervix of young women is composed of a single layer of columnar epithelial cells, in contrast to the multilayer of squamous cells in older women. This difference at the cell level increases susceptibility to STIs and HIV.[5,6]

Pathogenesis

In brief, after inoculation with HIV, dendritic cells internalize the virus and travel to the lymph node, where T-cell infection and replication takes place. HIV then seeds, infects, and proliferates within the gut associated lymphoid tissue (GALT). Acute retroviral syndrome occurs within days to six weeks after HIV infection, as the initial viremic phase with seeding of the lymphoid tissue destroys CD4 and CD8 T-cells. Thirty to ninety percent of patients present to their health care providers, including the emergency department, with a viral-like illness (as a result of the viremia), with few patients being properly diagnosed. As the immune system starts to control the infection, the viral load decreases and the symptoms resolve.[14]

The activated immune system allows the CD4 T-cell count to rebound and stabilize. The patient then enters a period in which viral suppression is at equilibrium with viral replication. This is the patient's set point. A patient progresses to AIDS when the viral load increases, resulting in an imbalance of the set point. AIDS is defined as CD4 T-cell count below 200, resulting in a severely compromised immune system with the concomitant development of AIDS-defining illnesses. Without medical treatment, patients succumb to opportunistic infections and expire one to two years after being given the diagnosis of AIDS.[5,14]

Clinical Presentation of HIV infection in Children

Since the introduction of Highly Active Anti-Retroviral Therapy

Table 1. 1994 Revised Pediatric Classification System: Clinical Categories[31]

Category N: Not Symptomatic

Children who have no signs or symptoms considered to be the result of HIV infection or who have only one of the conditions listed in category A.

Category A: Mildly Symptomatic

Children with two or more of the following conditions but none of the conditions listed in categories B and C:

- Lymphadenopathy (≥ 0.5 cm at more than two sites; bilateral nodes at one anatomic level [e.g., neck] do not count as two sites)
- Hepatomegaly
- Splenomegaly
- Dermatitis
- Parotitis
- Recurrent or persistent upper respiratory infection, sinusitis, or otitis media

Category B: Moderately Symptomatic

Children who have symptomatic conditions, other than those listed for category A or C, that are attributed to HIV infection. Examples of conditions in clinical category B include but are not limited to the following:

- Anemia (< 8 g/dL), neutropenia (< 1000/ìL), or thrombocytopenia (< 100,000/ìL) persisting ≥ 30 days
- Bacterial meningitis, pneumonia, or sepsis (single episode)
- Candidiasis, oropharyngeal (i.e., thrush) persisting for > 2 months in children aged > 6 months
- Cardiomyopathy
- Cytomegalovirus infection with onset before age 1 month
- Diarrhea, recurrent or chronic
- Hepatitis
- Herpes simplex virus (HSV) stomatitis, recurrent (i.e., more than two episodes within 1 year)
- HSV bronchitis, pneumonitis, or esophagitis with onset before age 1 month
- Herpes zoster (i.e., shingles) involving at least two distinct episodes or more than one dermatome
- Leiomyosarcoma
- Lymphoid interstitial pneumonia (LIP) or pulmonary lymphoid hyperplasia complex
- Nephropathy
- Nocardiosis
- Fever lasting > 1 month
- Toxoplasmosis with onset before age 1 month
- Varicella, disseminated (i.e., complicated chickenpox)

Modified from Centers for Disease Control and Prevention. 1994 Revised classification system for human immunodeficiency virus infection in children less than 13 years of age; official authorized addenda: human immunodeficiency virus infection codes and official guidelines for coding and reporting ICD-9-CM. *MMWR Morb Mortal Wkly Rep* 1994;43(RR-12):1-19; and Centers for Disease Control and Prevention. Revised surveillance case definitions for HIV Infection among adults, adolescents, and children aged < 18 months and for HIV infection and AIDS among children aged 18 months to < 13 years — United States, 2008. *MMWR* 2008;57(RR-10):1-13.

(HAART) to the management of HIV in 1996, there has been a massive impact on not only the outcome but also on the clinical presentation of HIV infection. Universal screening of mothers during pregnancy has produced the biggest change, with the elimination of transmission in most patients and moderate to significant delay in the onset of symptoms in others.

HAART has had a tremendous impact as to how the child presents, yet there are additional factors that influence clinical presentation, including the stage of the disease, treatment, associated risk factors, prior conditions, and seasonal variability. The spectrum of disease in the pediatric patient can range from asymptomatic to full-fledged AIDS. Similarly, the variability of clinical presentation can range from nonspecific viral illness with nonspecific complaints to classic *Pneumocystis jirovecii* pneumonia.

In 1994, the CDC developed criteria for children and adolescents based upon age and stage of illness. The criteria stratified illness into age

Table 1. 1994 Revised Pediatric Classification System: Clinical Categories[31] (continued)

Category C: Severely Symptomatic

Children who have any condition listed in the 1987 surveillance case definition for AIDS, with the exception of LIP (which is a category B condition)

- Serious bacterial infections, multiple or recurrent (that is, any combination of at least two culture-confirmed infections within a two-year period), of the following types: septicemia, pneumonia, meningitis, bone or joint infection, or abscess of an internal organ or body cavity (excluding otitis media, superficial skin or mucosal abscesses, and indwelling catheter-related infections)
- Candidiasis, esophageal or pulmonary (bronchi, trachea, lungs)
- Coccidioidomycosis, disseminated (at site other than or in addition to lungs or cervical or hilar lymph nodes)
- Cryptococcosis, extrapulmonary
- Cryptosporidiosis or isosporiasis with diarrhea persisting > 1 month
- Cytomegalovirus disease with onset of symptoms at age > 1 month (at a site other than liver, spleen, or lymph nodes)
- Encephalopathy (at least one of the following progressive findings present for at least two months in the absence of a concurrent illness other than HIV infection that could explain the findings): a) failure to attain or loss of developmental milestones or loss of intellectual ability, verified by standard developmental scale or neuropsychological tests; b) impaired brain growth or acquired microcephaly demonstrated by head circumference measurements or brain atrophy demonstrated by computerized tomography or magnetic resonance imaging (serial imaging is required for children aged < 2 years); c) acquired symmetric motor deficit manifested by two or more of the following: paresis, pathologic reflexes, ataxia, or gait disturbance
- Herpes simplex virus infection causing a mucocutaneous ulcer that persists for > 1 month or bronchitis, pneumonitis, or esophagitis for any duration affecting a child aged > 1 month
- Histoplasmosis, disseminated (at a site other than or in addition to lungs or cervical or hilar lymph nodes)
- Kaposi sarcoma
- Lymphoma, primary, in brain
- Lymphoma, small, noncleaved cell (Burkitt), or immunoblastic or large cell lymphoma of B-cell or unknown immunologic phenotype
- Mycobacterium tuberculosis, disseminated or extrapulmonary
- Mycobacterium, other species or unidentified species, disseminated (at a site other than or in addition to lungs, skin, or cervical or hilar lymph nodes)
- *Mycobacterium avium* complex or *Mycobacterium kansasii*, disseminated (at site other than or in addition to lungs, skin, or cervical or hilar lymph nodes)
- *Pneumocystis jirovecii* pneumonia
- Progressive multifocal leukoencephalopathy
- Salmonella (nontyphoid) septicemia, recurrent
- Toxoplasmosis of the brain with onset at age > 1 month
- Wasting syndrome in the absence of a concurrent illness other than HIV infection that could explain the following findings: a) persistent weight loss > 10% of baseline; OR b) downward crossing of at least two of the following percentile lines on the weight-for-age chart (such as 95th, 75th, 50th, 25th, 5th) in a child ≥ 1 year of age; OR c) < 5th percentile on weight-for-height chart on two consecutive measurements, ≥ 30 days apart PLUS 1) chronic diarrhea (that is, ≥ two loose stools per day for > 30 days), OR 2) documented fever (for ≥ 30 days, intermittent or constant)

Modified from Centers for Disease Control and Prevention. 1994 Revised classification system for human immunodeficiency virus infection in children less than 13 years of age; official authorized addenda: human immunodeficiency virus infection codes and official guidelines for coding and reporting ICD-9-CM. *MMWR Morb Mortal Wkly Rep* 1994;43(RR-12):1-19; and Centers for Disease Control and Prevention. Revised surveillance case definitions for HIV Infection among adults, adolescents, and children aged <18 months and for HIV infection and AIDS among children aged 18 months to < 13 years — United States, 2008. *MMWR* 2008;57(RR-10):1-13.

ranges (less than/greater than 13 years of age), as well as stage of illness (HIV vs. AIDS). Additionally, the stratification is further delineated in relation to HIV stage and age younger than 13 years. This delineation is displayed in Table 1, in which the four clinical categories (N, A, B, C) are shown and described.

Children are generally asymptomatic during the first few months of life and typically follow one of the three patterns. The first pattern, termed rapid progressors, is seen in approximately 10% of

Table 2. Identifying, Diagnosing, and Managing Acute and Recent HIV-1 Infection

Suspecting Acute HIV Infection

Signs or symptoms of acute HIV infection with recent (within 2 to 6 weeks) high risk of exposure to HIV[a]

- Signs/symptoms/laboratory findings may include but are not limited to one or more of the following: fever, lymphadenopathy, skin rash, myalgia/arthralgia, headache, diarrhea, oral ulcers, leukopenia, thrombocytopenia, transaminase elevation.
- High-risk exposures include sexual contact with an HIV-infected person or a person at risk of HIV infection, sharing injection drug use paraphernalia, or contact of mucous membranes or breaks in skin with potentially infectious fluids.

Differential Diagnosis

Includes but is not limited to viral illnesses such as Epstein-Barr virus (EBV)- and non-EBV (e.g., cytomegalovirus) infectious mononucleosis syndromes, influenza, viral hepatitis, streptococcal infection, or syphilis.

Evaluation/Diagnosis of Acute HIV Infection

Acute infection is defined as detectable HIV RNA or p24 antigen (the antigen used in currently available HIV antigen/antibody [Ag/Ab] combination assays), in serum or plasma in the setting of a negative or indeterminate HIV antibody test result

- A reactive HIV antibody test or Ag/Ab test must be followed by supplemental confirmatory testing.
- A negative or indeterminate HIV antibody test in a person with a positive Ag/Ab test or in whom acute HIV infection is suspected requires assessment of plasma HIV RNA[b] to assess for acute HIV infection.
- A positive plasma HIV RNA test in the setting of a negative or indeterminate antibody result is consistent with acute HIV infection.

Patients presumptively diagnosed with acute HIV infection should have serologic testing repeated over the next 3 to 6 months to document seroconversion.

Considerations for Antiretroviral Therapy (ART) During Early HIV Infection

- All pregnant women with early HIV infection should begin taking combination ART as soon as possible because of the high risk of perinatal HIV transmission.
- Treatment for early HIV infection should be offered to all non-pregnant persons.
- The risks of ART during early HIV infection are largely the same as those for ART initiated in chronically infected asymptomatic patients with high CD4 counts.
- If therapy is initiated, the goal should be sustained plasma virologic suppression.
- Providers should consider enrolling patients with early HIV infection in clinical studies.

[a] In some settings, behaviors conducive to acquisition of HIV infection might not be ascertained or might not be perceived as high risk by the health care provider or the patient or both. Thus, symptoms and signs consistent with acute retroviral syndrome should motivate consideration of this diagnosis even in the absence of reported high-risk behaviors.

[b] Plasma HIV RNA can be measured by a variety of quantitative assays, including branched DNA (bDNA) and reverse transcriptase-polymerase chain reaction (RT-PCR)-based assays as well as by a qualitative transcription-mediated amplification assay (APTIMA, GenProbe).

Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents Developed by the HHS Panel on Antiretroviral Guidelines for Adults and Adolescents — A Working Group of the Office of AIDS Research Advisory Council (OARAC)

patients who become symptomatic by 1 year of age and have a higher mortality rate. The second pattern seen in the majority of children (80-85%) is termed slow progressors. This group generally becomes symptomatic after 5 years of age. The last pattern includes fewer than 2% of children. These children are positive for HIV infection but stay asymptomatic for greater than 10 years. This category is referred to as

long-term non-progressors.

Acute HIV syndrome, which is also known as acute seroconversion syndrome, acute retroviral syndrome, or primary HIV infection, signifies a patient's first-time exposure to the HIV virus. The host's immune system responds with antibody production and, after a period of 2-4 weeks, the person develops nonspecific flu-like symptoms due to the viremic burst. Antibodies have not yet formed at this stage, but viral material (p24 antigen or HIV RNA) can be detected. Symptoms often last 1-3 weeks. When present (in 40-90% of patients), symptoms may be vague and are described in Table 2. It is important to note that approximately 10-60% of individuals with early HIV infection do not experience symptoms,[15] and serious complications are uncommon.

Children with undiagnosed HIV presenting to the ED with fever can be a challenge. The ED physician must have a high index of suspicion and acute retroviral syndrome in the differential, as the majority of febrile illnesses in children are viral and non-life-threatening. Patients with prolonged fever and serious bacterial infections, specifically opportunistic infections, require a more aggressive evaluation. The most common invasive infections seen in the pediatric HIV population that presents with fever include pneumonia secondary to *Streptococcus pneumoniae*, *Staphylococcus aureus* skin infections, and herpes zoster infections.[16] The evaluation for patients with suspected invasive infections includes a complete blood count, C-reactive protein, blood culture, throat culture, urine analysis, urine culture, liver function tests, and viral testing (RSV, influenza, CMV, EBV). Additionally, lumbar puncture with cerebrospinal fluid evaluation should be strongly considered. Lastly, a chest radiograph should be obtained and abdominal imaging should be considered, given the clinical scenario.

The critically ill child with HIV/AIDS who requires resuscitation in the ED has higher morbidity and mortality rates.[17] Patients presenting with the clinical findings of oral candidiasis, oral hairy leukoplakia, dermatomal varicella, lymphadenopathy, or constitutional symptoms are more likely to be rapid progressors. *Pneumocystis jirovecii* pneumonia (formerly *Pneumocystis carinii* pneumonia [PCP]) is a major concern in patients with HIV. In a study conducted from 1986-2006, 39% of patients were infected with PCP pneumonia. However, during the past decade with the use of trimethoprim-sulfamethoxazole and antiretroviral therapy, the incidence has declined to approximately 15%.[18,19]

There are important differences in the HIV infection presentation when comparing children and adolescents to adults. These differences are displayed in Table 3.

System-based Presentation of HIV Infection

Depending upon the stage of the HIV infection, the patient can have varying presentations. Almost every organ system can be involved, and multi-system involvement is common. The child with encephalopathy or meningitis can present with neurological symptoms. Common organisms in the HIV-positive patient include *Cryptococcus neoformans*, *Mycobacterium tuberculosis,* and *Toxoplasma gondii*. The typical skin manifestations include atopic dermatitis, seborrheic dermatitis, herpes zoster infection, or molluscum contagiosum. In addition to skin problems, immunocompromised children and adolescents develop intraoral and esophageal candidiasis. The renal manifestations include generalized kidney swelling from nephrotic syndrome. Pneumonia with *Pneumocystis jirovecii*, lymphocytic interstitial pneumonitis (LIP), and tuberculosis should be considered with the presentation of cough, increased work of breathing, and shortness of breath. Additionally, an ED presentation that includes tachycardia, tachypnea, poor feeding, and cool and pale extremities warrants an evaluation that excludes pericardial effusion, pericarditis, and myocarditis.[20] Lastly, it is not uncommon for youth with HIV/AIDS to have chronic diarrhea as well as anemia from multiple causes.

Age-related Clinical Presentation of Children with HIV Infection

Neonatal. Newborns acquire HIV from their mothers during pregnancy, delivery, or as the result of breastfeeding. The majority of neonates are asymptomatic; however, the following signs and symptoms can also be seen: generalized lymphadenopathy, hepatosplenomegaly, recalcitrant thrush, chronic diarrhea, failure to thrive, recurrent bacterial infection, increased tone, severe eczema, and developmental delay.

Younger than 2 Years of Age. Young children present with generalized lymphadenopathy, hepatomegaly, splenomegaly, failure to thrive, persistent candidiasis,[21] and dermatitis. In this age range, children have a higher risk of infection with invasive bacteria (*Streptococcus pneumoniae*, *Haemophilus influenzae* type b, and *Salmonella* spp.)[22] and *Pneumocystis jirovecii* (formerly *Pneumocystis carinii* pneumonia [PCP]).[23] The hallmark of *Pneumocystis jirovecii* pneumonia includes a nonproductive cough, tachypnea, fever, and persistent hypoxia with nonspecific chest radiograph findings. Neurological findings include delay or loss in motor and cognitive development secondary to progressive encephalopathy. While immunization for *Streptococcus pneumonia* and *Haemophilus influenzae* type b have significantly decreased the infection rate in HIV-infected infants and children, the ED physician should have a high index of suspicion for invasive bacterial infections.

Older Children and Adolescents (6-21 Years). In addition to the previously described illnesses, children in this age range have a higher risk of recurrent otitis media, pneumonia, and sinusitis. They may present with severe sore throat with odynophagia,[24,25] persistent parotid swelling, LIP, or infection with herpes zoster.

Table 3. Differences Between Children and Adults in HIV Presentation

- There is a shorter time line in children for progression from HIV to AIDS compared to adults (10 years, except for rapid progressors who take approximately 2-3 years).
- Children tend to progress to more severe illness than adults, secondary to immune status not being fully matured.
- The rate of invasive bacterial infection is higher and represents the most frequent HIV-related infection in children.
- Lab parameters are less predictive of severity of disease in children.
- PCP is most common serious opportunistic infection in children, with peak age 3-6 months in infants who are not on ART regimen.
- PCP and CMV primary infection are seen frequently in children, and in adults it is more of re-activation of latent infection.
- PCP is the leading cause of death in children.
- Malignancy is not frequently seen in children.
- Lymphocytic interstitial pneumonitis (LIP) is much more common in pediatric population than in adults.
- In pediatric patients, it is rare to see cerebral toxoplasmosis, cryptococcal disease, progressive multifocal leukoencephalopathy, Kaposi's sarcoma, bacillary angiomatosis, cytomegalovirus retinitis, and central nervous system lymphoma.[32]
- Adolescents with HIV infection reflect disease closer to the adult presentation, but the survivor of perinatal infection attaining adolescence can have their own unique presentation, but more like a mixed picture.
- Infection with *Mycobacterium tuberculosis* and *Mycobacterium avium* are less common in the pediatric population.[32]
- Children have less hypersensitivity to trimethoprim-sulfamethoxazole.

Neurologically progressive cognitive and growth delay can be seen.

HIV and Influenza

Children and adolescents with HIV need more thorough evaluations and aggressive treatments when infected with influenza A/B. As per the CDC guidelines, patients with HIV/AIDS are considered high risk and should be given early treatment with anti-viral medications. The HIV-infected pediatric patient tends to have leukopenia, interstitial pneumonia, and consolidations. The attack rate in patients with HIV is as high as 20% when compared to the general population.[26]

HIV and Sexually Transmitted Infections

Approximately half of all STIs occur in adolescents and young adults aged 15 to 24 years. The incidence of gonorrhea, chlamydia, herpes, and syphilis is high among HIV-infected patients,[27,28] with an increase in the number of new *Treponema pallidum* infections. Additionally, STIs increase the susceptibility to HIV. EDs should screen all patients presenting with an STI with a rapid HIV antibody test.

Opportunistic Infection

HIV-related conditions and opportunistic infections have significantly declined since the introduction of anti-retroviral treatment, but they have not disappeared. The most common opportunistic infection pathogens include *Pneumocystis jiroveci*, *Mycobacterium avium*, *Cryptosporidium*, CMV.[16,29] Underdiagnosis of HIV infections, poor compliance with treatment, and viral resistance contribute to this phenomenon.

Clinical Presentation Secondary to Allergic Reaction to HIV Medications

Children can present with drug reactions from both primary medicines and preventive medicines. The presentation can include nonspecific rashes, Stevens-Johnson syndrome, hepatotoxicity, nephrotoxicity, and hematological manifestations. The majority of medication-related complications and reactions are seen in the first few weeks of treatment. In general, the removal of the offending medication (in conjunction with collaboration with an HIV specialist or immunologist) will result in improvement of the symptoms.[30]

Differential Diagnosis

The differential diagnosis is lengthy and includes infections, malignancies, and drug reactions. Symptoms of acute retroviral syndrome resemble other illnesses, such as influenza, infectious mononucleosis, acute hepatitis, roseola, syphilis, and toxoplasmosis. A national ambulatory study done in 2005 estimated that acute HIV represented 0.5-0.7% of all patients who presented for treatment of fever or rash.[3]

Diagnostics

All pediatric patients with signs and symptoms consistent with HIV or an opportunistic infection should be screened for HIV. The diagnosis of HIV is a multi-step process. Patients are first screened with an ELISA or a rapid HIV antibody test. These tests have a high sensitivity but low specificity and must be confirmed with a Western blot, an HIV DNA (qualitative), or an HIV RNA (quantitative) test.

Patients with signs and symptoms consistent with acute retroviral syndrome should be screened with both a rapid HIV antibody test and

an HIV RNA viral load. The standard rapid HIV antibody screen will likely be negative during the acute HIV infection, given that the initial viremic phase precedes the antibody response. Seroconversion takes anywhere from 10-14 days to 3-4 weeks.[14]

Newborns and infants up to 18 months of age can have lingering maternal HIV antibodies, and initially should be screened with an HIV DNA test. The ELISA, rapid HIV antibody test, and Western blot should not be used.[5,14]

Management

After the preliminary diagnosis of HIV is made in the ED, the patient should be referred to an HIV specialist for all confirmatory tests and further management. The emergency physician should not initiate antiretroviral therapy without the direction of an HIV specialist or immunologist. Additionally, patients will need to be screened and treated for opportunist infections prior to the initiation of antiretroviral therapy. Further, additional resources including social work and care managers should be utilized, if available, after the initial HIV diagnosis is made in the ED.

The patient's CD4 T-cell count and HIV profile will dictate management. The triple-drug regimen, which consists of a non-nucleoside reverse transcriptase inhibitor (NNRTI) *or* protease inhibitor (PI) plus two nucleoside or nucleotide reverse transcriptase inhibitors (NRTIs), can be used. New medications such as fusion inhibitors have been developed and are being used as a salvage regimen for multi-resistant viruses. The goals of antiretroviral therapy are to suppress viral replication, minimize viral drug resistance, restore immunologic function, and improve clinical symptoms. As the immune system recovers and reconstitutes, a decrease in the viral load is seen with a subsequent rise in CD4 T-cell number. Clinical and immunologic statuses (CD4 T-cell count and viral set point) predict a patient's morbidity and mortality.[5,14]

Complications

Immune reconstitution inflammatory syndrome (IRIS) is a pro-inflammatory response seen in the AIDS patient once antiretroviral therapy is started. It is believed to be the immune system's response to dormant opportunistic infections. Clinical signs include pneumonitis, lymphadenitis, hepatomegaly, and splenomegaly. Treatment consists of opportunistic infection elimination, steroids, and immunosuppressants.[14]

Case Conclusions

Case 1. A 17-year-old female with fever, sore throat, and rash, who recently went camping in North Carolina and reports having sex with women and men without using condoms, presents to the ED. The ED physician should obtain a rapid HIV antibody test and an HIV RNA viral load. The rapid HIV antibody can be negative during the initial viremic phase prior to the formation of antibody; however, the HIV RNA viral load will be positive. This patient was diagnosed with acute retroviral syndrome and was referred to an HIV specialist.

Case 2. A 14-year-old male with fever and an " infectious mononucleosis-like" illness who recently had a negative rapid HIV antibody test but continues to engage in sexual activity with multiple partners without using condoms presents to the ED. The ED physician should obtain a rapid HIV antibody test. This patient's rapid HIV was reactive. The patient was referred to an HIV specialist, and a confirmatory Western blot was conducted, which was positive. The patient's viral load and CD4 T-cell count were obtained and were 30,000 and 350, respectively. The patient was diagnosed with HIV.

Case 3. A 15-year-old male presents with dysphagia secondary to esophageal candidiasis, unintentional weight loss, and a previous viral-like illness. The ED physician should obtain a rapid HIV antibody test. This patient's rapid HIV test was reactive. The patient was referred to an HIV specialist, and a confirmatory Western blot was conducted, which was positive. The patient's viral load and CD4 T-cell count were obtained and were over one million and zero, respectively. The patient was diagnosed with AIDS.

References

1. Centers for Disease Control and Prevention. Prevalence of undiagnosed HIV infection among persons aged 13 years — National HIV Surveillance System, United States, 2005-2008. *MMWR* 2012;61:57-63.
2. American Academy of Pediatrics — Committee on Pediatric AIDS. Adolescents and HIV infection: The pediatrician's role in promoting routine testing. *Pediatrics* 2011;128(5):1023-1028.
3. Centers for Disease Control and Prevention. Revised recommendations for HIV testing of adults, adolescents, and pregnant women in health-care settings. *MMWR* 2006;55(RR14):1-17.
4. American Academy of Pediatrics — Committee on Pediatric AIDS and Committee on Adolescence. Adolescents and human immunodeficiency virus infection: The role of the pediatrician in prevention and intervention. *Pediatrics* 2001;107(1):188-190.
5. Simpkins EP, Siberry GK, Hutton N. Thinking about HIV Infection. *Pediatrics in Review* 2009;30(9):337-347.
6. Spiegel HML and Futterman DC. Adolescents and HIV: Prevention and clinical care. *Current HIV/AIDS Reports* 2009;6:100-107.
7. Haines CJ, Uwazuoke K, Zussman B, et al. Pediatric emergency department-based rapid HIV testing. *Pediatric Emerg Care* 2011;27(1):13-16.
8. Tolou-Shams M, Payne N, Houck C, et al and the Project SHIELD Study Group. HIV testing among at-risk adolescents and young adults: A prospective analysis of a community sample. *J Adolescent Health* 2007;41:586-593.
9. Arbelaez C, Wright EA, Losina E, et al. Emergency provider attitudes and barriers to universal HIV testing in the emergency department. *J Emerg Med* 2009;42(1): 7-14.
10. Torres M. Rapid HIV screening in the emergency department. *Emerg Med Clin North Am* 2010;28:369-380.
11. Wilson SR, Mitchell C, Bradbury DR, et al. Testing for HIV: Current practices in the academic ED. *Am J Emerg Med* 1999;17:354-356.
12. Marks G, Crepaz N, Senterfitt W, et al. Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States: Implications for HIV prevention programs. *J Acquir Immune Defic Syndr* 2005;39(4):446-453.
13. Walensky RP, Reichmann WM, Arbelaez C, et al. Couselor- versus provider-based HIV screening in the emergency department: Results from the Universal

Screening for HIV infection in the Emergency Room (USHER) randomized controlled trial. *Ann Emerg Med* 2011;58:S126-132.

14. Rich RR, Fleisher TA, Shearer WT et al. HIV Infection and Acquired Immunodeficiency Syndrome. *Clinical Immunology: Principles and Practice*. 2012;465-479.
15. Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services. http://aidsinfo.nih.gov/ContentFiles/AdultandAdolescentGL.pdf.
16. Gona P, Van Dyke RB, Williams PL, et al. Incidence of opportunistic and other infections in HIV-infected children in the HAART era. *JAMA* 2006;296(3):292.
17. Ahmad S, Ellis JC, Kamwendo H, et al. Impact of HIV infection and exposure on survival in critically ill children who attend a paediatric emergency department in a resource-constrained setting. *Emerg Med J* 2010;27(10):746-749.
18. Dankner WM, Lindsey JC, Levin MJ, et al. Correlates of opportunistic infections in children infected with the human immunodeficiency virus managed before highly active antiretroviral therapy. *Pediatr Infect Dis J* 2001;20:40-48.
19. Gona P, Van Dyke RB, Williams PL, et al. Incidence of opportunistic and other infections in HIV infected children in the HAART era. *JAMA* 2006;296:292-300.
20. Lipshultz SE, Easley KA, Orav EJ, et al. Cardiovascular status of infants and children of women infected with HIV-1 (P(2)C(2) HIV): A cohort study. Pediatric Pulmonary and Cardiovascular Complications of Vertically Transmitted HIV Infection (P(2)C(2) HIV) Study Group. *Lancet* 2002;360(9330):368.
21. Chiou CC, Groll AH, Gonzalez CE, et al. Esophageal candidiasis in pediatric acquired immunodeficiency syndrome: Clinical manifestations and risk factors. *Pediatr Infect Dis J* 2000;19(8):729.
22. Katkin JP, Hansen TN, Langston C, et al. Pulmonary manifestations of AIDS in children. *Semin Pediatr Infect Dis* 1990;1:40.
23. Simonds RJ, Oxtoby MJ, Caldwell MB, et al. *Pneumocystis carinii* pneumonia among US children with perinatally acquired HIV infection. *JAMA* 1993;270(4):470.
24. de Jong MD, Hulsebosch HJ, Lange JM. Clinical, virological and immunological features of primary HIV-1 infection. *Genitourin Med* 1991;67(5):367-73.
25. Valle SL. Febrile pharyngitis as the primary sign of HIV infection in a cluster of cases linked by sexual contact. *Scand J Infect Dis* 1987;19(1):13-17.
26. Giannattasio A, Lo Vecchio A, Russo T, et al. Pandemic flu: A comparative evaluation of clinical, laboratory, and radiographic findings in HIV-positive and negative children. *AIDS* 2010;24: 2292-2294.
27. Stamm WE, Handsfield HH, Rompalo AM, et al. The association between genital ulcer disease and acquisition of HIV infection in homosexual men. *JAMA* 1988;260(10):1429.
28. Ganesan A, Fieberg A, Agan BK, et al. Results of a 25-year longitudinal analysis of the serologic incidence of syphilis in a cohort of HIV-infected patients with unrestricted access to care. Infectious Disease Clinical Research Program HIV Working Group. *Sex Transm Dis* 2012;39(6):440.
29. Guillén S, García San Miguel L, Resino S, et al. Opportunistic infections and organ-specific diseases in HIV-1-infected children: A cohort study (1990-2006). Madrid Group for Research on Pediatric HIV Infection. *HIV Med* 2010;11(4):245.
30. Reust CE. Common adverse effects of antiretroviral therapy for HIV disease. *Am Fam Physician* 2011;83: **[Pages?]**.
31. Centers for Disease Control. Revised surveillance case definitions for HIV infection among adults, adolescents, and children aged < 18 months and for HIV infection and AIDS among children aged 18 months to < 13 years — United States, 2008. *MMWR* December 5, 2008/57(RR10).
32. Domachowske J. Pediatric human immunodeficiency virus infection. *Clin Microbiol Rev* 1996;9:448-468.

CME Questions

1. Which of the following is true regarding policy statements about HIV screening?
   A. All persons aged 13-64 years old should be screened for HIV in all health care settings, excluding emergency departments.
   B. All persons aged 13-64 years old should be screened for HIV in all health care settings, including emergency departments.
   C. All persons aged 21-64 years old should be screened for HIV in all health care settings, including emergency departments
   D. All persons aged 18-64 years old should be screened for HIV in all health care settings, including emergency departments.
2. Despite recommendation from the CDC, what percentage of EDs screen for HIV?

Pediatric Emergency Medicine Reports

CME Objectives

Upon completion of this educational activity, participants should be able to:

• recognize specific conditions in pediatric patients presenting to the emergency department;

• describe the epidemiology, etiology, pathophysiology, historical and examination findings associated with conditions in pediatric patients presenting to the emergency department;

• formulate a differential diagnosis and perform necessary diagnostic tests;

• apply up-to-date therapeutic techniques to address conditions discussed in the publication;

• discuss any discharge or follow-up instructions with patients.

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A. 25%
B. 50%
C. 80%
D. 10%
E. 5%

3. Adolescent behavioral risk factors that increase risk of acquiring HIV/AIDS include all of the following *except*:

   A. sex at an early age
   B. multiple partners
   C. frequent condom use
   D. illicit drug use
   E. history of sexually transmitted infections

4. Which of the following cells are destroyed during an HIV infection?

   A. dendritic cells
   B. B-cells
   C. T-cells
   D. none of the above
   E. all of the above

5. The CDC has developed which of the following criteria for pediatric and adolescent HIV/AIDS?

   A. age </>5 years, HIV vs. AIDS
   B. age </>13 years, HIV vs. AIDS
   C. age </> 13 years, high/low CD4 count
   D. age </> 13 years, high/low CD8 count
   E. none of the above

6. Common opportunistic organisms associated with HIV/AIDS include all of the following *except*:

   A. *Mycobacterium avium*
   B. *Cryptosporidium parvum*
   C. Adenovirus
   D. *Pnuemocystic jirovecii*
   E. CMV

7. Which of the following is a true statement regarding HIV infection?

   A. STIs increase the susceptibility to HIV.
   B. *Staphylococcus aureus* may result in increased susceptibility to HIV seroconversion.
   C. Chlamydia may result in increased susceptibility to HIV seroconversion.
   D. Tuberculosis may result in increased susceptibility to HIV seroconversion.
   E. none of the above

8. HIV is a member of which family of viruses?

   A. HIV DNA
   B. AIDS RNA
   C. RNA retrovirus
   D. DNA retrovirus
   E. none of the above

9. A patient with which of the following is more likely to transmit HIV?

   A. low viral load
   B. medium viral load
   C. no viral load
   D. high viral load
   E. none of the above

10. Differences in presentation of HIV/AIDS in children compared to adults include all of the following e*xcept*:

    A. There is a shorter time line in children for progression from HIV to AIDS.
    B. Children tend to develop more severe disease than adults because they have less mature immune systems.
    C. Lymphocytic interstitial pneumonitis is more common in children than adults.
    D. Lab parameters better predict disease severity in children than in adults.

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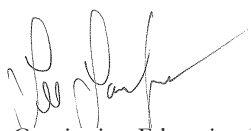

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HIV in the Pediatric and Adolescent Population: The Role of the Pediatric Emergency Provider

1994 Revised Pediatric Classification System: Clinical Categories

Category N: Not Symptomatic

Children who have no signs or symptoms considered to be the result of HIV infection or who have only one of the conditions listed in category A.

Category A: Mildly Symptomatic

Children with two or more of the following conditions but none of the conditions listed in categories B and C:

- Lymphadenopathy (≥ 0.5 cm at more than two sites; bilateral nodes at one anatomic level [e.g., neck] do not count as two sites)
- Hepatomegaly
- Splenomegaly
- Dermatitis
- Parotitis
- Recurrent or persistent upper respiratory infection, sinusitis, or otitis media

Category B: Moderately Symptomatic

Children who have symptomatic conditions, other than those listed for category A or C, that are attributed to HIV infection. Examples of conditions in clinical category B include but are not limited to the following:

- Anemia (< 8 g/dL), neutropenia (< 1000/iL), or thrombocytopenia (< 100,000/iL) persisting ≥ 30 days
- Bacterial meningitis, pneumonia, or sepsis (single episode)
- Candidiasis, oropharyngeal (i.e., thrush) persisting for > 2 months in children aged > 6 months
- Cardiomyopathy
- Cytomegalovirus infection with onset before age 1 month
- Diarrhea, recurrent or chronic
- Hepatitis
- Herpes simplex virus (HSV) stomatitis, recurrent (i.e., more than two episodes within 1 year)
- HSV bronchitis, pneumonitis, or esophagitis with onset before age 1 month
- Herpes zoster (i.e., shingles) involving at least two distinct episodes or more than one dermatome
- Leiomyosarcoma
- Lymphoid interstitial pneumonia (LIP) or pulmonary lymphoid hyperplasia complex
- Nephropathy
- Nocardiosis
- Fever lasting > 1 month
- Toxoplasmosis with onset before age 1 month
- Varicella, disseminated (i.e., complicated chickenpox)

Modified from Centers for Disease Control and Prevention. 1994 Revised classification system for human immunodeficiency virus infection in children less than 13 years of age; official authorized addenda: human immunodeficiency virus infection codes and official guidelines for coding and reporting ICD-9-CM. *MMWR Morb Mortal Wkly Rep* 1994;43(RR-12):1-19; and Centers for Disease Control and Prevention. Revised surveillance case definitions for HIV Infection among adults, adolescents, and children aged < 18 months and for HIV infection and AIDS among children aged 18 months to < 13 years — United States, 2008. *MMWR* 2008;57(RR-10):1-13.

Category C: Severely Symptomatic

Children who have any condition listed in the 1987 surveillance case definition for AIDS, with the exception of LIP (which is a category B condition)

- Serious bacterial infections, multiple or recurrent (that is, any combination of at least two culture-confirmed infections within a two-year period), of the following types: septicemia, pneumonia, meningitis, bone or joint infection, or abscess of an internal organ or body cavity (excluding otitis media, superficial skin or mucosal abscesses, and indwelling catheter-related infections)
- Candidiasis, esophageal or pulmonary (bronchi, trachea, lungs)
- Coccidioidomycosis, disseminated (at site other than or in addition to lungs or cervical or hilar lymph nodes)
- Cryptococcosis, extrapulmonary
- Cryptosporidiosis or isosporiasis with diarrhea persisting > 1 month
- Cytomegalovirus disease with onset of symptoms at age > 1 month (at a site other than liver, spleen, or lymph nodes)
- Encephalopathy (at least one of the following progressive findings present for at least two months in the absence of a concurrent illness other than HIV infection that could explain the findings): a) failure to attain or loss of developmental milestones or loss of intellectual ability, verified by standard developmental scale or neuropsychological tests; b) impaired brain growth or acquired microcephaly demonstrated by head circumference measurements or brain atrophy demonstrated by computerized tomography or magnetic resonance imaging (serial imaging is required for children aged < 2 years); c) acquired symmetric motor deficit manifested by two or more of the following: paresis, pathologic reflexes, ataxia, or gait disturbance
- Herpes simplex virus infection causing a mucocutaneous ulcer that persists for > 1 month or bronchitis, pneumonitis, or esophagitis for any duration affecting a child aged > 1 month
- Histoplasmosis, disseminated (at a site other than or in addition to lungs or cervical or hilar lymph nodes)
- Kaposi sarcoma
- Lymphoma, primary, in brain
- Lymphoma, small, noncleaved cell (Burkitt), or immunoblastic or large cell lymphoma of B-cell or unknown immunologic phenotype
- Mycobacterium tuberculosis, disseminated or extrapulmonary
- Mycobacterium, other species or unidentified species, disseminated (at a site other than or in addition to lungs, skin, or cervical or hilar lymph nodes)
- *Mycobacterium avium* complex or *Mycobacterium kansasii*, disseminated (at site other than or in addition to lungs, skin, or cervical or hilar lymph nodes)
- *Pneumocystis jirovecii* pneumonia
- Progressive multifocal leukoencephalopathy
- Salmonella (nontyphoid) septicemia, recurrent
- Toxoplasmosis of the brain with onset at age > 1 month
- Wasting syndrome in the absence of a concurrent illness other than HIV infection that could explain the following findings: a) persistent weight loss > 10% of baseline; OR b) downward crossing of at least two of the following percentile lines on the weight-for-age chart (such as 95th, 75th, 50th, 25th, 5th) in a child ≥ 1 year of age; OR c) < 5th percentile on weight-for-height chart on two consecutive measurements, ≥ 30 days apart PLUS 1) chronic diarrhea (that is, ≥ two loose stools per day for > 30 days), OR 2) documented fever (for ≥ 30 days, intermittent or constant)

Modified from Centers for Disease Control and Prevention. 1994 Revised classification system for human immunodeficiency virus infection in children less than 13 years of age; official authorized addenda: human immunodeficiency virus infection codes and official guidelines for coding and reporting ICD-9-CM. *MMWR Morb Mortal Wkly Rep* 1994;43(RR-12):1-19; and Centers for Disease Control and Prevention. Revised surveillance case definitions for HIV Infection among adults, adolescents, and children aged <18 months and for HIV infection and AIDS among children aged 18 months to < 13 years — United States, 2008. *MMWR* 2008;57(RR-10):1-13.

Identifying, Diagnosing, and Managing Acute and Recent HIV-1 Infection

Suspecting Acute HIV Infection

Signs or symptoms of acute HIV infection with recent (within 2 to 6 weeks) high risk of exposure to HIV[a]

- Signs/symptoms/laboratory findings may include but are not limited to one or more of the following: fever, lymphadenopathy, skin rash, myalgia/arthralgia, headache, diarrhea, oral ulcers, leukopenia, thrombocytopenia, transaminase elevation.
- High-risk exposures include sexual contact with an HIV-infected person or a person at risk of HIV infection, sharing injection drug use paraphernalia, or contact of mucous membranes or breaks in skin with potentially infectious fluids.

Differential Diagnosis

Includes but is not limited to viral illnesses such as Epstein-Barr virus (EBV)- and non-EBV (e.g., cytomegalovirus) infectious mononucleosis syndromes, influenza, viral hepatitis, streptococcal infection, or syphilis.

Evaluation/Diagnosis of Acute HIV Infection

Acute infection is defined as detectable HIV RNA or p24 antigen (the antigen used in currently available HIV antigen/antibody [Ag/Ab] combination assays), in serum or plasma in the setting of a negative or indeterminate HIV antibody test result

- A reactive HIV antibody test or Ag/Ab test must be followed by supplemental confirmatory testing.
- A negative or indeterminate HIV antibody test in a person with a positive Ag/Ab test or in whom acute HIV infection is suspected requires assessment of plasma HIV RNA[b] to assess for acute HIV infection.
- A positive plasma HIV RNA test in the setting of a negative or indeterminate antibody result is consistent with acute HIV infection.

Patients presumptively diagnosed with acute HIV infection should have serologic testing repeated over the next 3 to 6 months to document seroconversion.

Considerations for Antiretroviral Therapy (ART) During Early HIV Infection

- All pregnant women with early HIV infection should begin taking combination ART as soon as possible because of the high risk of perinatal HIV transmission.
- Treatment for early HIV infection should be offered to all non-pregnant persons.
- The risks of ART during early HIV infection are largely the same as those for ART initiated in chronically infected asymptomatic patients with high CD4 counts.
- If therapy is initiated, the goal should be sustained plasma virologic suppression.
- Providers should consider enrolling patients with early HIV infection in clinical studies.

[a] In some settings, behaviors conducive to acquisition of HIV infection might not be ascertained or might not be perceived as high risk by the health care provider or the patient or both. Thus, symptoms and signs consistent with acute retroviral syndrome should motivate consideration of this diagnosis even in the absence of reported high-risk behaviors.

[b] Plasma HIV RNA can be measured by a variety of quantitative assays, including branched DNA (bDNA) and reverse transcriptase-polymerase chain reaction (RT-PCR)-based assays as well as by a qualitative transcription-mediated amplification assay (APTIMA, GenProbe).

Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents Developed by the HHS Panel on Antiretroviral Guidelines for Adults and Adolescents — A Working Group of the Office of AIDS Research Advisory Council (OARAC)

Differences Between Children and Adults in HIV Presentation

- There is a shorter time line in children for progression from HIV to AIDS compared to adults (10 years, except for rapid progressors who take approximately 2-3 years).
- Children tend to progress to more severe illness than adults, secondary to immune status not being fully matured.
- The rate of invasive bacterial infection is higher and represents the most frequent HIV-related infection in children.
- Lab parameters are less predictive of severity of disease in children.
- PCP is most common serious opportunistic infection in children, with peak age 3-6 months in infants who are not on ART regimen.
- PCP and CMV primary infection are seen frequently in children, and in adults it is more of re-activation of latent infection.
- PCP is the leading cause of death in children.
- Malignancy is not frequently seen in children.
- Lymphocytic interstitial pneumonitis (LIP) is much more common in pediatric population than in adults.
- In pediatric patients, it is rare to see cerebral toxoplasmosis, cryptococcal disease, progressive multifocal leukoencephalopathy, Kaposi's sarcoma, bacillary angiomatosis, cytomegalovirus retinitis, and central nervous system lymphoma.
- Adolescents with HIV infection reflect disease closer to the adult presentation, but the survivor of perinatal infection attaining adolescence can have their own unique presentation, but more like a mixed picture.
- Infection with *Mycobacterium tuberculosis* and *Mycobacterium avium* are less common in the pediatric population.
- Children have less hypersensitivity to trimethoprim-sulfamethoxazole.

Supplement to *Pediatric Emergency Medicine Reports*, July 2013: "Human Immunodeficiency Virus in the Pediatric and Adolescent Population: The Role of the Pediatric Emergency Medicine Provider."
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