Invited Review

Routine and Special Vaccinations in People With HIV

Hillary A. Dunlevy, MD, MPH; Steven C. Johnson, MD

University of Colorado, Aurora

Abstract: *Vaccinations are an important part of primary care for people with HIV (PWH) and can protect against viral hepatitis and some sexually transmitted infections, as well as respiratory bacterial and viral infections. Vaccinations for influenza, COVID-19, herpes zoster (shingles), hepatitis B, meningococcal disease, mpox, and human papillomavirus are recommended for PWH. Additionally, the Advisory Committee on Immunization Practices has released recommendations incorporating the newer formulations of the pneumococcal pneumonia and respiratory syncytial virus vaccines. Additional considerations for the timing of vaccinations are described, including whether to delay vaccination until improvement of the immune status. Live vaccines (other than nonreplicating) are contraindicated for PWH with CD4+ counts less than 200 cells/μL or uncontrolled HIV.*

Keywords: COVID-19, hepatitis B, herpes zoster, HIV, human papillomavirus, immunosuppression, influenza, meningococcus, mpox, pneumococcus, pneumonia, respiratory syncytial virus, vaccination, vaccine

Introduction

Vaccinations have saved millions of lives by preventing infections or serious manifestations of infections. An estimated 34 infectious diseases have a vaccine that offers some protection.[1] The Centers for Disease Control and Prevention (CDC) offers guidance for a variety of vaccinations for people with HIV (PWH), including those that protect against sexually transmitted infections, respiratory illnesses, and other serious viral and bacterial infections.[2]

Viruses that can cause sexually transmitted infections that can be prevented by vaccines include hepatitis B virus (HBV), hepatitis A virus (HAV), human papillomavirus (HPV), and mpox virus. Additionally, meningococcal disease can be transmitted by close contact including kissing, coughing, or sharing drinks or utensils. Vaccine protection should be addressed in routine sexual health discussions between clinicians and patients.

Many respiratory illnesses can be prevented by vaccination and often occur seasonally, such as the fall/winter pattern seen with influenza and respiratory syncytial virus (RSV). Other bacterial respiratory infections, such as pneumococcal infections, can accompany viral infections. Vaccinations should be discussed during routine primary care visits for PWH.

One consideration for vaccinations for PWH is whether to administer the vaccines to individuals who have low CD4+ cell counts or HIV viremia. Table 1 provides guidance around which vaccines can be given immediately regardless of the CD4+ cell count and which can be delayed until after PWH are taking antiretroviral therapy (ART) and have improvement in CD4+ cell count, Table 2 and Table 3 outline recommended immunizations for PWH stratified by age, and Table 4 provides recommendations for travel vaccines in PWH.

Influenza Virus

The influenza vaccine is generally recommended for everyone, but some populations have an increased risk for medical complications from influenza, including people aged 50 years and older; those with chronic pulmonary disease, cardiovascular disease, or metabolic disorders (including diabetes mellitus and obesity); those who are immunocompromised; residents of long-term care facilities; and those who are pregnant. Annual inactivated influenza vaccine or recombinant influenza vaccine is recommended by the Advisory Committee on

Author Correspondence
Write to Hillary A. Dunlevy, MD, MPH, University of Colorado Infectious Diseases Group Practice, 1635 Aurora Court, 7th floor, Aurora, CO, 80045, or email Hillary.dunlevy@cuanschutz.edu.

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Table 1. Timing of Vaccination in People With HIV

Vaccine	CD4+ count criteria	Source
Mpox	Give regardless of CD4+ count	ACIP guidelines[3]
PCV20	Give regardless of CD4+ count (OI guidelines) or when CD4+ count is ≥200 cells/μL	OI guidelines[2]
PPSV23	Preferably defer until CD4+ count is >200 cells/μL	OI guidelines[2]
RSV	Presumably give regardless of CD4+ count as it is not a live vaccine and is given in the fall	—
Tdap	Give regardless of CD4+ count	Adult immunization schedule[4]
Varicella	Give only when CD4+ count is ≥200 cells/μL	Adult immunization schedule[4]
Yellow fever	Give only when CD4+ count ≥200 cells/μL	Adult immunization schedule[4]
Herpes zoster	Give recombinant vaccine regardless of CD4+ count; discussion suggests lower humoral and cellular immune responses in persons with low CD4+ count	Berkowitz et al[5]
COVID-19	Give regardless of CD4+ count	CDC[4] and NIH COVID-19 treatment guidelines[6]
Hepatitis A	Give regardless of CD4+ count	OI guidelines[2] and adult immunization schedule[4]
Hepatitis B	Give regardless of CD4+ count; in nonresponders, can delay revaccination until CD4+ count is ≥200 cells/μL and sustained with antiretroviral therapy	OI guidelines[2]
HPV	Immune responses appear stronger among those with higher CD4+ counts and suppressed HIV viral loads	OI guidelines[2]
Influenza	Give regardless of CD4+ count	Adult immunization schedule[4]
MMR	Give only when CD4+ count is ≥200 cells/μL	Adult immunization schedule[4]
Meningococcal conjugate	Better immunogenicity if CD4+ count percentage is >15% but deferral is not specifically recommended	MacNeil et al[7]

Abbreviations: ACIP, Advisory Committee on Immunization Practices; CDC, Centers for Disease Control and Prevention; HPV, human papillomavirus; MMR, measles, mumps, and rubella; NIH, National Institutes of Health; OI, opportunistic infection; PCV20, pneumococcal conjugate vaccine (protects against 20 serotypes); PPSV23, pneumococcal polysaccharide vaccine (protects against 23 serotypes); RSV, respiratory syncytial virus; Tdap, tetanus, diphtheria, and pertussis.

Immunization Practices (ACIP). The live attenuated influenza vaccine is contraindicated in PWH.[9] For those aged 65 years and older, the high-dose or adjuvanted influenza vaccine should be offered.[10] The high-dose vaccine has 4 times the antigen of standard influenza vaccines (60 μg hemagglutinin/strain vs 15 μg hemagglutinin/strain), and several studies have demonstrated a more robust antibody response to the high-dose vaccine.[11,12]

Varicella Zoster Virus

Herpes zoster, or shingles, is caused by reactivation of varicella zoster virus and is a common complication in PWH, with rates more than twice as high as an HIV-negative cohort in the Veterans Aging Cohort Study. Individuals with HIV viral suppression younger than 60 years and aged 60 years and older had higher rates of herpes zoster than individuals without HIV.[7] Current guidelines changed in 2021 to reflect the increased risk of herpes zoster for all PWH, expanding vaccination from age 50 years and older to age 18 years and older with 2 doses of the recombinant zoster vaccine at month 0 and at 2 to 6 months later. Of note, some experts recommend delaying vaccination until viral suppression is achieved on ART or until the CD4+ count is greater than 200 cells/μL.

SARS-CoV-2 Virus

Several studies have shown that PWH with COVID-19 have worse outcomes than the general population. In a large trial from the World Health Organization Global Clinical Platform with data from 24 countries, HIV was associated with a 15% increase in odds of presenting with severe COVID-19 and a 38% increase in odds of dying in the hospital.[14] Increased risk was associated with HIV even among those with viral suppression. A multicenter

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Table 2. Recommended Pneumococcal Vaccination Options for People With HIV[a]

Vaccination history	Option A	Option B	Notes
Patients aged <65 y			
Unvaccinated	PCV20	PCV15 + PPSV23 8 wk later	—
PPSV23 only	PCV20 at ≥1 y	PCV15 at ≥1 y	—
PCV13 only	PCV20 at ≥1 y	PPSV23 at ≥8 wk, repeat PPSV23 at ≥5 y	Review pneumococcal recommendations at age 65 y
PCV13 + PPSV23	PCV20 at ≥5 y	PPSV23 at ≥5 y	Review pneumococcal recommendations at age 65 y
PCV13 + PPSV23 (2 doses)	PCV20 at ≥5 y	None	Review pneumococcal recommendations at age 65 y
Patients aged 65 y and older			
Unvaccinated	PCV20	PCV15 + PPSV23 8 wk later	—
PPSV23 only	PCV20 at ≥1 y	PCV15 at ≥1 y	—
PCV13 only	PCV20 at ≥1 y	PPSV23 at ≥1 y	—
PCV13 + PPSV23 at <65 y	PCV20 at ≥5 y	PPSV23 at ≥5 y	—

[a] Option A and Option B are both approved and available for use, depending on insurance coverage and availability of vaccines.

Abbreviations: PCV13, pneumococcal conjugate vaccine (protects against 13 serotypes); PCV15, pneumococcal conjugate vaccine (protects against 15 serotypes); PCV20, pneumococcal conjugate vaccine (protects against 20 serotypes); PPSV23, pneumococcal polysaccharide vaccine (protects against 23 serotypes).

cohort study of participants predominantly from the US demonstrated worse outcomes for PWH including a composite of intensive care unit admission, ventilatory support, and death. Another study also demonstrated worse outcomes for people with a CD4+ count less than 200 cells/μL, independent of viral suppression.[15] However, studies demonstrate that vaccination protects PWH. A Canadian prospective, observational cohort study of PWH compared with controls showed that both groups had similar levels of vaccine-induced immunoglobulin G (IgG), although a lower percentage of PWH maintained IgG levels at 6 months after vaccination (92% PWH vs 99% controls).[8] In a study in South Carolina that compared PWH with a control group, PWH did not have higher rates of breakthrough infections compared with people without HIV, nor did they have higher rates of severe infection. Along with the Canadian study demonstrating lower levels of sustained immunity in PWH, this study showed that PWH had higher rates of breakthrough infection when comparing PWH with people without HIV who had not received a booster-dose vaccination.[16] The COVID-19 Treatment Guidelines Panel recommends vaccination for all PWH with any CD4+ cell count and subsequent doses on the schedule recommended by the CDC and the ACIP.[6] Individuals with advanced HIV (CD4+ count less than 200 cells/μL, a history of an AIDS-defining illness without immune reconstitution, or clinical manifestations of symptomatic HIV) should follow advice for those who are moderately or severely immunocompromised.[17] PWH were included in studies for the 2 types of messenger RNA (mRNA) vaccines (Pfizer BioNTech and Moderna) and the glycoprotein vaccine (Novavax), and results showed that PWH on ART who have virologic suppression have a good immunologic response to the vaccines. For PWH, there are currently 3 options for COVID-19 vaccination, including 2 mRNA vaccines (Pfizer BioNTech and Moderna) and the glycoprotein vaccine (Novavax). The most updated guidance on COVID-19 immunization with any of the recommended vaccines can be found at the CDC website.[6]

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Table 3. Recommended Immunizations for People With HIV, by Age[a]

Disease(s)	Vaccination recommendation by age			
	19-26 y	27-59 y	60-64 y	≥65 y
Influenza	1 dose of influenza vaccine annually			1 dose (high dose) annually
Tdap	1 dose of Tdap, then Td or Tdap booster every 10 y			
Varicella infection	2 doses, 3 mo apart (if CD4+ count is ≥200 cells/μL and no immunity to varicella virus)			
HPV	3 doses (0, 2, and 6 mo)	27-45 y[b]	—	—
Herpes zoster infection	Recombinant vaccine: 2 doses at 0 and 2-6 mo			
MMR	1 or 2 doses (if CD4+ count is ≥200 cells/μL and no immunity to MMR viruses)			—
Pneumococcal disease	See Table 2			
Hepatitis A	2 or 3 doses depending on the vaccine, at 0 and 6-18 mo. Check HAVAb 1-2 mo after.			
Hepatitis B	2 or 3 doses depending on the vaccine. Check HBsAb 1-2 mo after.			
Meningococcal disease	If no prior vaccine, 2 doses of MenACWY 8-12 wk apart. Boost every 5 y. Group B vaccine given in special circumstances (see ACIP guidelines[3]).			
Mpox	2 doses separated by 28 days for those at risk[c]			
RSV	—	—	1 dose[d]	
COVID-19	The 2023-2024 formulations of the COVID-19 vaccine are available from several manufacturers. See CDC guidance.[8]			

[a] Immunizations should be given after assessment of age, presence of immunity to the pathogen (for hepatitis A and B), and CD4+ counts. Live replicating vaccines, including MMR, varicella, and yellow fever, should not be given if CD4+ count is less than 200 cells/μL. The oral live influenza vaccines are contraindicated in all people with HIV. Recommendations current as of October 2023.

[b] HPV vaccination for individuals aged 27 to 45 years should be approached with shared decision-making between the clinician and patient to assess for ongoing risk of exposure to HPV.

[c] Individuals at risk for mpox include those who may have contact with mpox through workplace or sexual exposure.

[d] RSV vaccination is recommended for those with cardiopulmonary disease, kidney disorders, liver disorders, neurologic or neuromuscular conditions, hematologic disorders, diabetes mellitus, or moderate or severe immune compromise (attributable to either a medical condition or receipt of immunosuppressive medications or treatment); persons who are frail; persons of advanced age; persons who reside in nursing homes or other long-term care facilities; and persons with other underlying conditions or factors that the practitioner determines might increase the risk for severe respiratory disease.

Abbreviations: ACIP, Advisory Committee on Immunization Practices; CDC, Centers for Disease Control and Prevention; HAVAb, hepatitis A virus antibody; HBsAb, hepatitis B surface antibody; HPV, human papillomavirus; MenACWY, meningococcal disease caused by serogroups A, C, W, and Y; MMR, measles, mumps, and rubella; RSV, respiratory syncytial virus; Td, tetanus and diptheria; Tdap, tetanus, diptheria, and pertussis.

Respiratory Syncytial Virus

RSV is more likely to cause hospitalization, lower respiratory tract disease, and death in older adults, with 60,000 to 160,000 hospitalizations and 6000 to 10,000 deaths in the US in those aged 65 years and older. There are 2 types of RSV vaccines licensed for use in the US: RSVPreF3 (Arexvy) and RSVpreF (Abrysvo), both recombinant prefusion F protein vaccines. The ACIP recommends that either RSV vaccine may be given as 1 dose with shared clinical decision-making for adults aged 60 years and older who are at the highest risk. Additionally, during RSV season, the ACIP recommends that pregnant persons at 32 to 36 weeks of gestation be vaccinated with 1 dose of RSVpreF.[18] Individuals at the highest risk for severe lower respiratory tract RSV disease include those with chronic lung disease, cardiovascular disease, moderate or severe immunocompromise, diabetes, neurologic or neuromuscular conditions, kidney disorders, liver disorders, or hematologic disorders; individuals who are frail; those of advanced age; and those who are residents of long-term care facilities.[19] A study that evaluated data from RSV-associated hospitalizations found obesity as a risk factor for hospitalization.[20] Given the risk for increased severity of RSV infection in those who are immunocompromised, it would be reasonable to offer this vaccine to PWH aged 60 years and older, especially those with advanced HIV and other comorbidities.

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Table 4. Vaccines for Travel for People With HIV

Vaccine	Location	Notes
Meningococcus	Parts of Africa	—
Polio	Nigeria, Afghanistan, Pakistan	Rarely given
Rabies	Many destinations	Prolonged trip, animal exposure
Typhoid	Central and South America, Mexico, Africa, and Asia	—
Yellow fever	Parts of Africa and South America (for individuals with CD4+ count ≥200 cells/μL)	—
Cholera	Various destinations	Site of an outbreak, any risk of exposure
Hepatitis A	Central and South America, Mexico, Africa, and Asia	—
Hepatitis B	Many destinations	Important if planned sexual activity
Influenza	All destinations	Seasonal by location
Japanese encephalitis	Parts of Asia	—
Chikungunya	Parts of Central and South America, Mexico, parts of Africa and Asia	Travelers to areas of outbreaks should be vaccinated, as well as those traveling to areas with transmission in the last 5 years[34]

Currently, there are no specific guidelines for the use of RSV vaccines in PWH. At this time, there is insufficient evidence to know if additional doses of the vaccine should be recommended.

Neither the RSVPreF3 nor the RSVpreF vaccine had an increased incidence of serious adverse events (AEs) compared with placebo, and each prevented symptomatic RSV-associated lower respiratory tract disease over 2 seasons (74.5% and 84.4%, respectively). The ACIP reviewed cases of inflammatory neurologic events occurring within 42 days in people with RSV vaccination, including Guillain-Barré syndrome, chronic inflammatory demyelinating polyneuropathy, and acute central nervous system inflammation. The RSVPreF3 and RSVpreF each had 3 cases of inflammatory neurologic events out of 17,922 and 20,255 participants, respectively, demonstrating a low incidence of these events. Both vaccine studies had slightly increased episodes of atrial fibrillation, which occurred in 10 participants in each of the vaccine groups and 4 participants in each of the control arms.[21,22] It is unclear if there is a relationship between the vaccine and these events, but more information may come from postmarketing AE reporting. This information can be used to inform a discussion of the risks and benefits of this vaccine.

Streptococcus pneumoniae

PWH are at higher risk for invasive pneumococcal infections than the general population, including those individuals on ART.[23,24] Several new pneumococcal vaccines have recently become available, substantially changing the recommendations for vaccination. A study demonstrated immunogenicity and safety of the 15-valent pneumococcal conjugate vaccine (PCV15) followed by 23-valent pneumococcal polysaccharide (PPSV23) vaccine in PWH.[25] Although PCV20 was not specifically studied in PWH, serotypes covered by PCV20 that are not covered by PCV15 make up 16.5% of cases of invasive pulmonary disease, which supports the use of PCV20, if available, to reduce the burden of disease.

PWH without a history of vaccination can be vaccinated with either PCV20 alone or a combination of PCV15 with PPSV23 administered 8 weeks later. Options are available for PWH younger than 65 years of age (Table 3). For those aged 65 years and older, the options are slightly simplified, with only 1 vaccine dose recommended after that age.

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Hepatitis A Virus

HAV is transmitted through fecal-oral routes. PWH are at high risk for severe disease from HAV infection. Person-to-person transmission has been documented in the US. Vaccination is recommended for all PWH aged 1 year and older.[26] Vaccination for hepatitis A is recommended at 0 and 6 to 12 months or in combination with hepatitis B vaccination (Twinrix) at 0, 1, and 6 months. Antibody response should be assessed 1 to 2 months after vaccination. If there is incomplete response in the setting of low CD4+ cell count, repeat vaccination should be offered when the CD4+ count rises to more than 200 cells/μL.[2]

Hepatitis B Virus

Hepatitis B is a common coinfection in PWH who are also at increased risk for developing chronic hepatitis B. The incidence of hepatitis B has been declining over time due to hepatitis B vaccination as well as suppression of chronic infection with antiviral treatment. Current recommendations are for initial vaccination to be with

The incidence of hepatitis B has been declining over time due to hepatitis B vaccination as well as suppression of chronic infection

1 of 3 HBV vaccines. The first option is the recombinant HBV surface antigen vaccine conjugated to an adjuvant toll-like receptor 9 (HBCpG, Heplisav-B) given at 0 and 1 month. The second is a double-dose recombinant hepatitis B vaccine at 0, 1, and 6 months, and the third option is the combined hepatitis A and hepatitis B vaccine (Twinrix) at 0, 1, and 6 months. The combination option may have lower immunogenicity given the lower dose of HBV antigen. Vaccinated individuals should have immunity checked with HBV surface antibody 1 to 2 months after vaccination. If there is inadequate response to the initial series (HBV surface antibody <10 mIU/mL), repeat vaccination is recommended. A recent studiy in individuals with inadequate response to initial hepatitis B vaccination has demonstrated superiority of repeat vaccination with HBcPG (Heplisav-B) 2 or 3 doses compared with recombinant hepatitis B vaccination.[27] The US Department of Health and Human Services (DHHS) Opportunistic Infection Guidelines recommend that HBV vaccination not be deferred based on CD4+ count, but if there is a lack of response to initial vaccination in the setting of a CD4+ count less than 200 cells/μL, repeat vaccination can be delayed until immune recovery.[2]

Individuals with HBV core antibody and no evidence of chronic infection or immunity should receive a standard-dose vaccination with a check in 1 to 2 months of quantitative HBV surface antibody (HBsAb) titer. If the HBsAb titer is less than 100 mIU/mL, the individual should receive complete vaccination.[2]

Human Papillomavirus

HPV infection is very common in the US, with approximately 80% of people having had HPV infection at some time. HPV causes almost 47,000 cancers every year in the US, including in the cervix, vagina, vulva, anus, oropharynx, and penis. Oropharyngeal cancer is the most common HPV-related cancer in men and cervical cancer the most common HPV-related cancer in women.[28] Rates of anal cancer in some PWH are more than 50 times the rates seen in the general population and all PWH are at higher risk for anal cancer.[29] Cervical cancer is the fourth most common cancer worldwide and is more common in PWH. Approximately 6% of cervical cancers are diagnosed in PWH.[30] HPV vaccination before exposure to the virus can prevent more than 90% of HPV-related cancers.

HPV vaccination for PWH is recommended in 3 doses at 0, 1, and 6 months at age 11 to 12 years, starting as early as age 9 years. The vaccine is most effective in preventing HPV infection when given at a young age, prior to exposure. PWH should not receive the 2-dose vaccine series. The HPV vaccine available in the US is

Rates of anal cancer in some PWH are more than 50 times the rates seen in the general population and all PWH are at higher risk for anal cancer

the 9-valent vaccine based on noninfectious viral capsids that protects against HPV 6, 11, 16, 18, 31, 33, 45, 52, and 58. Initially, HPV vaccination was offered only up to age 26 years, but in 2019, the ACIP expanded this recommendation for individuals at risk up to age 45 years

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with shared clinical decision-making with the patient and the clinician.[31] Vaccination from 27 to 45 years of age is recommended for people with ongoing risk, including those with new sexual partners, and has been shown to be effective and safe in this population. There is no current evidence suggesting that HPV vaccination reduces the risk of recurrent HPV-related disease in PWH; however, studies of therapeutic vaccines to treat HPV infection in this population are ongoing.[32,33]

Neisseria meningitidis

Although meningococcal disease is not common, there is a 5- to 13-fold higher risk in PWH than in the general population, with the highest risk in individuals with a low CD4+ cell count or with viremia.[7] In 2016, the meningococcal polysaccharide conjugate vaccines (either formulation MenACWY-CRM [Menveo] or MenACWY-TT [MenQuadfi]) were recommended for PWH in a 2-dose series at least 8 weeks apart with a booster every 5 years. A third formulation, MenACWY-D (Menactra), is no longer available. The meningococcal ACWY vaccines are interchangeable in adults.

Meningococcal B vaccine is recommended for some PWH, including those aged 16 to 23 years (preferred 16-18 years), those at risk (living in close quarters, those with asplenia), and during outbreaks. Two meningococcal B vaccines are available, MenB-4C (Bexsero; 2-dose series given at 0 and 1 month) and MenB-FHbp (Trumenba; PWH should receive the 3-dose series given at 0, 1 to 2, and 6 months, and not the 2-dose option). The meningococcal B vaccines are not interchangeable. The Food and Drug Administration approved a pentavalent A, B, C, W, and Y meningococcal vaccine (using the Men-FHbp or non-outer membrane vesicle [OMV]-based meningococcal B), which is available for persons ages 10 to 25 years, and its use in PWH has not been defined.

Recently, there has been investigation into whether meningococcal group B vaccine targeting the OMV could reduce the incidence of gonorrhea infection, given that the OMV is found on *Neisseria meningitidis* and on *Neisseria gonorrhoeae*. Retrospective population studies linking vaccination records to infections of gonorrhea in New Zealand and in the US showed between 31% and 40% vaccine effectiveness against gonorrhea after use of MenB-4C meningococcal B vaccine.[35,36] A study in Oregon colleges compared the use of 2 meningococcal B vaccines; MenB-4C is OMV based (Bexsero) and MenB-FHbp (Trumenba) is not. The OMV-based vaccine was 47% effective in preventing gonorrhea in this population.[37] Although these data suggest some protection by MenB-4C against gonorrhea, further prospective, randomized studies in larger populations are warranted to assess this effect. One prospective study, DOXYVAC (Combined Prevention of Sexually Transmitted Infections in Men Who Have Sex With Men and Using Oral Tenofovir Disoproxil Fumarate/Emtricitabine for HIV Preexposure Prophylaxis), demonstrated a trend toward MenB-4C protecting against gonorrhea, although the results did not reach statistical significance.[38]

Mpox

A worldwide epidemic of mpox peaked in the summer of 2022, with ongoing cases seen subsequently, though not at the levels of 2022. A CDC analysis of 103 individuals hospitalized with mpox showed that 90 (87%) of these individuals had HIV and 88% of those had a CD4+ count less than 200 cells/μL.[39] Twenty of 22 persons who died had HIV and none of those were on ART. PWH, especially those without viral suppression and low CD4+ cell counts, are at risk for severe disease from mpox. The ACIP recommends the mpox vaccine with the live, nonreplicating vaccinia vaccine (Modified Vaccinia Ankara–Bavaria Nordic, JYNNEOS) with 2 doses 4 weeks apart for individuals with HIV who are at risk for mpox exposure or request vaccination. If the second dose is delayed, it can be given as soon as possible without repeating the series. The vaccine can also be used as postexposure prophylaxis within 4 to 14 days after known exposure to someone with mpox, including sex in the past 2 weeks with someone with mpox. Immunogenicity to the live nonreplicating mpox vaccine is lower in PWH who are not virologically suppressed or with CD4+ counts less than 100 cells/μL. Live replicating vaccinia virus (ACAM2000) is contraindicated in PWH.

The mpox vaccine can be used as postexposure prophylaxis within 4 to 14 days after known exposure to someone with mpox

This article was based on the presentation, Routine and Special Immunizations for People With HIV, *by Steven C. Johnson, MD, in August 2023. The presentation webcast can be viewed at https://www.youtube.com/watch?v=_7yT2RW-5wY*

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