HIV in Older Adults

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Module 6: Key Populations
Lesson 4: HIV in Older Adults

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Background

With the advent of potent antiretroviral therapies, the life expectancy of individuals with HIV has increased dramatically, approaching that of the general population.[1,2,3] As a result, the HIV epidemic is increasingly characterized by an aging population. This demographic shift highlights several evolving health care needs: (1) medical care systems with the capacity to provide clinical services for a growing cohort of older persons with HIV, (2) expanded screening programs to detect HIV in older persons, and (3) strategies to prevent HIV transmission of HIV among older persons.

HIV and the Aging Process

The impact of HIV on aging is not entirely clear. With the benefit of antiretroviral therapy, most persons with HIV have a life expectancy similar to people without HIV. Nevertheless, many comorbid medical conditions, such as cardiovascular disease, diabetes, renal disease, and cancer, which are common to older persons in the general population, occur at an increased frequency in older people with HIV.[4,5,6,7] These age-associated non-AIDS conditions likely reflect an interplay of factors, including chronic inflammation, immune senescence, microbial translocation, and changes in the gut microbiome, all of which may contribute to accelerated aging and an increased overall burden of disease in the population with HIV.[8,9,10]

Complexity of Managing Older Persons with HIV

As the population of older persons with HIV in the United States grows, the evaluation and management of comorbid conditions associated with aging has become an increasingly central component of HIV clinical care. Most studies demonstrate that persons with chronic HIV are at elevated risk (and possibly earlier onset) of comorbities, including liver disease, cardiovascular disease, diabetes, non-AIDS malignancies, kidney disease, osteoporosis, neurocognitive impairment, and frailty.[7,11,12,13,14] In one analysis of United States veterans with HIV, 53% of persons aged 50 to 59 years had at least one comorbid medical disease, and this number increased to 66% in persons 60 years of age and older.[15] As a result, many older persons with HIV require multiple non-antiretroviral medications and have polypharmacy.[16]

Accelerated versus Accentuated Aging

Concept of Accelerated versus Accentuated Aging

Older persons with HIV have a higher prevalence of noninfectious comorbidities than age-matched persons without HIV, but it remains unclear whether this represents HIV-related accelerated aging, HIV-related accentuated aging, or both (Figure 1).[12] With accelerated aging, an age-related comorbid condition could occur at an earlier age in persons with HIV compared to those without HIV. With accentuated aging, an age-related comorbid condition could occur more commonly (at a higher rate) at all ages in persons with HIV compared to those without HIV. It is also possible that both accelerated and accentuated aging could coexist, with conditions developing at both an earlier age and at a higher rate.[12] Further, higher prevalence rates of comorbid conditions, such as smoking, drug use, and viral hepatitis, in persons with HIV may confound studies examining the impact of HIV on aging.[17,18]

Accelerated Aging in Persons with HIV

The hypothesis that HIV leads to premature or accelerated aging is biologically plausible, but remains unproven. This concept emerged from studies showing that comorbid conditions occur at younger ages in persons with HIV than persons without HIV, including among individuals taking antiretroviral therapy.[11,17,19] In addition, adults with HIV have immune profiles that mimic those found in older adults without HIV, supporting the hypothesis that HIV-related immune dysfunction and inflammation contribute to early aging of the immune system (immunosenescence).[8,11,20] In a study of biomarkers of innate immunity in persons with HIV (with and without detectable HIV RNA levels) and persons without HIV, those with HIV who had detectable HIV RNA levels showed levels of age-related monocyte activation biomarkers comparable to persons without HIV who were 12 years older.[21] This effect was less pronounced in the subset of persons with HIV who had undetectable HIV RNA levels—their markers corresponded to those seen in controls without HIV who were 4 years older.[21]

Accentuated Aging in Persons with HIV

In contrast to the accelerated aging paradigm, in which comorbid conditions develop at younger ages, the accentuated aging hypothesis posits that adults with HIV have an elevated risk of comorbidities at all ages relative to those adults without HIV.[4,12] Findings from a nested study in the Veterans Aging Cohort Study (VACS) confirmed that adults with HIV are at increased risk for myocardial infarction, end-stage renal disease, and non-AIDS-defining malignancies, but these outcomes occur at similar ages in adults with or without HIV.[4] In this study, as in others, factors such as smoking, dyslipidemia, oncogenic viral infections, male sex, low socioeconomic status, and high blood pressure conferred a risk for aging-associated diseases that was similar to or greater than that conferred by HIV.[4] Thus, a paradigm of “accentuated aging” is emerging, whereby it is believed the risk of comorbidities is higher at every age relative to the risk in adults without HIV.[4] Ongoing studies that evaluate accelerated (premature) versus accentuated aging will be important, as findings may have implications for screening and other disease prevention strategies.

Epidemiology of HIV in Older Persons

Age of Persons Living with Diagnosed HIV

The Centers for Disease Control and Prevention (CDC) reports on the number of persons diagnosed with HIV in the United States, including all persons who have been diagnosed with HIV and are still living, regardless of when the diagnosis was made.[22] At year-end 2022, there were 1,093,147 persons diagnosed with HIV in the United States. Among those diagnosed with HIV, 53.5% were 50 years of age and older (Figure 2).[22] Over the past 20 years, the population of older adults with HIV in the United States has gradually increased, reflecting improved survival due to suppressive antiretroviral therapy.

Age of Persons with New HIV Diagnoses

The CDC also reports on the number of new HIV diagnoses each year, which reflects individuals with a new positive HIV test during the year; these individuals, however, may have acquired HIV long before the diagnosis of HIV was made. Of the 37,663 adults and adolescents newly diagnosed with HIV diagnoses in 2022, persons 50 years of age and older accounted for 15.5% of these new diagnoses (Figure 3).[22] In addition, the new HIV diagnosis rate (persons diagnosed with HIV per 100,000 population) was lower among persons 50 years of age than among those 20–49 years of age.[22]

Relationship Between Age and HIV Stage at Time of HIV Diagnosis

In 2022, among persons 55–64 years of age or older newly diagnosed with HIV, 32.8% had stage 3 HIV infection (AIDS) at the time of diagnosis (based on a CD4 count less than 200 cells/mm^3, a CD4 percentage less than 14%, or an AIDS-defining clinical condition).[23] The percentage of those with stage 3 was even higher (33.5%) among persons 65 years of age or older at the time of HIV diagnosis (Figure 4).[23] These data, which show that older persons with HIV are diagnosed with a lower CD4 cell count, are important when considering the relatively attenuated CD4 cell reconstitution with antiretroviral therapy in older adults.[24,25]

Screening and Detection of HIV in Older Adults

HIV Screening Guidelines

The Centers for Disease Control and Prevention (CDC) recommends that all individuals ages 13 to 64 be tested for HIV at least once, with more frequent testing if there are ongoing risks for HIV acquisition.[26] Current CDC screening guidelines do not recommend routine HIV testing for persons 65 years of age and older, even though many individuals in this age group continue to be sexually active. National surveys have shown high rates of sexual activity in older adults, but low rates of condom use due to a lack of need for pregnancy prevention and a low perception of the risk of acquiring HIV and other sexually transmitted infections.[27,28,29] In addition, erectile dysfunction medications have enabled continued sexual activity among many older men. Among older women, age-related changes that lead to vaginal dryness can increase the risk of HIV acquisition.[30] Major barriers to HIV screening in older adults include their lack of awareness about HIV risk and underestimation of HIV risk by medical providers who may assume their older patients are not sexually active.[30]

Awareness of HIV Diagnosis

Available CDC surveillance data estimate that more than 95% of persons with HIV who are 55 years of age or older are aware of their HIV diagnosis; this very high awareness of HIV status among older individuals contrasts with a much lower percentage among persons in younger age groups (Figure 5).[31]

Antiretroviral Therapy in the Older Patient with HIV

Initiating Antiretroviral Therapy in Persons Older than Age 50

The Adult and Adolescent ARV Guidelines recommend initiating antiretroviral treatment in all persons with HIV, including persons 50 years of age and older, regardless of the CD4 cell count.[27] There are multiple reasons to justify starting antiretroviral therapy in all persons with HIV who are older than 50 years of age:

- Older adults with HIV have a greater risk of developing non-AIDS complications than younger persons with HIV.
- Immunologic responses to antiretroviral therapy may be blunted in older adults with HIV.
- Chronic HIV may contribute to accelerated development of age-related comorbid conditions.
- Persons older than 50 years can have a significant risk of HIV acquisition and transmission due to unfavorable changes in mucosal surfaces and low frequency of condom use.
- Antiretroviral therapy substantially reduces AIDS-related and non-AIDS-related mortality in older persons with HIV.[32,33,34,35]

Selection of Antiretroviral Regimens in Older Persons

The Adult and Adolescent ARV Guidelines recommend the same regimens for older adults with HIV as for younger adults with HIV.[27,36] Unfortunately, most antiretroviral therapy trials have included only a small proportion of persons older than 50 years, and there are no unique guidelines for initial regimens or monitoring while on antiretroviral therapy for older adults with HIV. Since older adults have higher rates of comorbid medical conditions, such as renal or liver disease, some experts have advocated closer monitoring for antiretroviral therapy side effects, drug toxicity, and adverse interactions with other disease-related medications.[27](Table 1)

Virologic Response to Antiretroviral Treatment in Older Adults

Older adults with HIV achieve equivalent or superior virologic responses to antiretroviral therapy compared with younger adults with HIV.[32,33,34] In a retrospective cohort study involving 5,000 adults with HIV initiating antiretroviral therapy, investigators reported higher rates of suppressed HIV RNA levels in persons older than 50 years than in persons younger than 50 years, likely reflecting better adherence in the older patients.[35] These findings, however, were not replicated in the NA-ACCORD Study, possibly because patients in this study, across all age groups, had good adherence.[24] In CDC surveillance data that examined the HIV Care Continuum according to age group, persons in the older age groups had the highest levels of HIV RNA suppression (Figure 6).[23]

Immunologic Recovery in Older Persons with HIV

Multiple studies have shown that older adults with HIV have less robust CD4 count responses to antiretroviral therapy than younger adults.[24,25,34,35,37] The following summarizes data from several key studies related to immunologic recovery in older persons with HIV after starting antiretroviral therapy.

- **NA-ACCORD**: The North American AIDS Cohort Collaboration on Research and Design (NA-ACCORD) found that older adults were less likely than younger adults to have a CD4 increase of at least 100 cells/mm^3 in the first two years of antiretroviral therapy.[24]
- **Euro SIDA**: In the EuroSIDA cohort study, older adults had lower median CD4 cell increases, lower maximum CD4 cell counts, and were less likely to achieve a CD4 increase of at least 100 cells/mm^3 or 200 cells/mm^3 compared with younger adults.[25]
- **ART Cohort Collaboration**: In the ART Cohort Collaboration, investigators analyzed 13 cohort studies involving 12,574 persons with HIV who started combination antiretroviral therapy and found that age 50 years and older was associated with an increased probability of clinical progression to

AIDS events or death.[38]

Drug Interactions and Polypharmacy

The Adult and Adolescent ARV Guidelines include tables that provide important information on drug interactions between antiretroviral medications and other medications.[39] Any antiretroviral regimen that includes ritonavir or cobicistat can potentially cause significant interactions with other medications. Other antiretroviral medications can also cause significant drug interactions. These drug interactions are particularly relevant in older adults with HIV who take multiple concomitant medications. Furthermore, the high prevalence of multiple comorbidities among older adults with HIV increases the likelihood of polypharmacy.[30,40] In one study, 82% of adults with HIV took at least one additional medication, and 58% took more than five; these numbers were higher than for persons without HIV.[41] Not surprisingly, older adults with HIV are more likely than younger adults with HIV to take multiple medications.[42,43,44] In addition, older adults are more likely to have renal or hepatic impairment that can impact metabolism and elimination of medications.[27]

Strategies to Reduce Medication-Related Toxicity in Older Patients

Strategies to reduce the risk of drug interactions and toxicity include using a pharmacy that has an integrated computer system, performing a formalized annual drug review and reconciliation of patient medication lists, and adjusting medication doses, as appropriate, in persons with renal or hepatic dysfunction.[30] Some expert panels recommend using the Cockcroft-Gault equation to estimate creatinine clearance for determining renal dosage adjustments of medications.[30] Although this equation is not as accurate in older persons, it is the method most widely used to estimate renal function in package inserts and in renal dosing charts.[30] The HIV renal guidelines indicate that the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation is another acceptable option for calculating creatinine clearance.[45]

Comorbid Conditions in Older Persons with HIV

The following summarizes some of the common comorbid conditions, especially those with high clinical importance, that occur in older adults with HIV.

Cancer

As individuals with HIV live longer when taking effective antiretroviral therapy, non-AIDS malignancies, such as colorectal and lung cancer, have become more frequent and a more common cause of death.[18,46,47] Multiple trials, including the Antiretroviral Therapy Cohort Collaboration (ART-CC), Data Collection on Adverse Events of Anti-HIV Drugs (D:A:D), and the SMART, trial have found that increasing age is strongly associated with an increased risk of non-AIDS malignancies.[30,48,49] The shift in the types of cancer among people with HIV underscores the importance of incorporating standardized cancer screening and surveillance practices into routine care, especially as adults with HIV get older.

Cardiovascular Disease

Cardiovascular disease is a major concern for adults with HIV. Multiple studies have shown that adults with HIV have an increased risk of cardiovascular disease compared with the general population, with this increased relative risk typically estimated at about 1.5- to 2-fold.[50,51,52] The following summarizes two additional studies:

- A Kaiser observational study of more than 4,000 patients demonstrated that adults with HIV had higher rates of myocardial infarction and hospitalization for coronary heart disease compared to similar-aged adults without HIV.[53]
- The Veterans Aging Cohort Study, which involved nearly 90,000 veterans, also showed a higher risk of myocardial infarction among veterans with HIV compared to veterans without HIV, and this difference was observed across multiple decades of age (Figure 7).[50]

This elevated risk is multifactorial, reflecting the combined effects of traditional risk factors (e.g., age, dyslipidemia, obesity, and smoking), metabolic alterations related to some antiretroviral regimens (e.g., insulin resistance and dyslipidemia), and nontraditional factors linked to HIV itself, such as immune activation, inflammation, and immunosuppression: [51,54,55] Evaluating or managing cardiovascular risk factors in older adults with HIV should follow the guidelines established for the general population. In older adults with HIV, assessment and management of cardiovascular risk factors are extremely important, and some experts have suggested that risk calculators likely underestimate the risk of cardiovascular disease in persons with HIV.

Diabetes Mellitus

Diabetes mellitus is an expanding epidemic in the aging population in the United States, with approximately 29% of all adults 65 years of age and older meeting the criteria for diabetes.[56] In general, persons with HIV and diabetes should be managed according to the American Diabetes Association (ADA) guidelines for older adults.[57] For older adults with few coexisting chronic illnesses, intact cognitive function, and good functional status, the target HbA1c should be less than 7.0-7.5%.[58,59] For older adults with coexisting chronic illnesses, cognitive impairment, or functional dependence, the target HbA1c should be less than 8.0-8.5%, especially if they have a life expectancy of less than 5 years or are at high risk for hypoglycemia or drug interactions.[30,59]

Frailty

Frailty is generally defined as a state of increased vulnerability in older adults, adults, characterized by a poor response to and recovery from a stressor event, such that a relatively small event may cause a disproportionate decline in health status.[60] Normal aging is associated with a gradual decline in physiological reserve, but in frailty syndrome, the decline is accelerated.[60] Common manifestations of

frailty include extreme fatigue, recurrent infections, falls, delirium, or fluctuating disability.[61] Experts on aging have quantitatively defined frailty as the presence of three or more of the following five parameters:[61]

1. Unintentional weight loss
2. Self-reported exhaustion
3. Low energy expenditure
4. Slow gait speed
5. Weak grip strength

Several studies have shown that adults with HIV are at higher risk of developing frailty and at a younger age than adults without HIV.[62,63,64] In a cross-sectional study of 445 adults with HIV in an outpatient setting, risk factors for frailty syndrome included prior opportunistic infections, more advanced immune suppression, and a higher number of comorbidities.[62] Additional factors associated with frailty in persons with HIV include longer time since HIV diagnosis, low current CD4 cell count, low nadir CD4 cell count, detectable plasma HIV RNA levels, low or high body mass index, hepatitis C virus infection, diabetes, kidney disease, and longer duration of antiretroviral therapy.[65]

Neurocognitive Disorders

Cognitive disorders, including dementia, are widespread in the general population in the United States. Age is the primary predictor of dementia, with the prevalence of dementia nearly doubling every 10 years after age 60.[66] Overall, adults with HIV have poorer cognitive performance than adults without HIV.[67] Several studies in persons with HIV have identified multiple risk factors for neurocognitive decline: older age, low nadir CD4 cell count, detectable plasma HIV RNA levels, prior central nervous system injury, and comorbidities, such as hypertension, viral hepatitis, and substance use disorder.[30,68] Screening for cognitive impairment should be incorporated into the routine care of older persons with HIV. Brief, validated, clinic-based instruments for assessing cognitive status include the Montreal Cognitive Assessment (MoCA) and the International HIV Dementia Scale; these tests, however, are not sensitive for diagnosing HIV-associated neurocognitive disorder (HAND), especially milder stages.[69,70,71] Persons with HIV who have abnormal screening results should be referred for formal neuropsychiatric testing, which is required to diagnosis HAND. It is also important to recognize that older individuals with HIV are at risk for Alzheimer's disease and cerebrovascular disease.[30] Treatable causes of neurocognitive disorders, such as substance use disorders, medication-related effects, thyroid disease, vitamin B12 deficiency, syphilis, opportunistic infections, tumor, and depression, should be identified and addressed.

Osteoporosis

Decreased bone mineral density is common among older individuals in the general population; between 2017 and 2018, 4 to 20% of persons in the United States 50 years of age and older had osteoporosis, and 33 to 52% had decreased bone density at the lumbar spine or hip.[72] Studies conducted earlier in the HIV epidemic demonstrated lower bone density and higher fracture rates in adults with HIV compared to those without HIV, with an increased fracture prevalence disproportionate to age in both men and women with HIV.[73,74,75] The extent to which hypogonadism contributes to bone loss in men with HIV who are receiving suppressive antiretroviral therapy remains unclear. In persons with HIV, an increased risk of osteoporosis and fracture has been associated with lower body weight, smoking, vitamin D deficiency, and use of tenofovir DF.[74,76,77,78,79,80] As a result, most experts avoid tenofovir DF in persons with increased risk for osteoporosis, and some avoid tenofovir DF in older patients in general. In addition, persons with HIV and osteoporosis who receive calcium-containing antacids should be counseled about potential interactions with antiretroviral medications, particularly when antacids are administered with oral integrase strand transfer inhibitors (INSTIs).

Renal Disease

As in the general population, chronic kidney disease in adults with HIV significantly increases the risk of cardiovascular disease, frailty, and all-cause mortality.[30,45] The estimated prevalence of chronic kidney disease among adults with HIV in North America ranges from 5 to 10%, and the prevalence of albuminuria is estimated to be 2- to 5-fold higher among persons with HIV compared to those without HIV.[45] Older age is an important predictor of chronic kidney disease in adults with HIV; other factors include use of tenofovir DF, female sex, diabetes, hypertension, hepatitis C infection, injection drug use, history of acute kidney injury, lower CD4 cell count, and higher HIV RNA levels.[45] The HIV Medical Association/Infectious Diseases Society of America (HIVMA/IDSA) has provided a comprehensive Clinical Practice Guideline for the Management of Chronic Kidney Disease in Patients Infected with HIV that provides management recommendations for renal disease among persons with HIV.[45]

Testosterone Deficiency

Hypogonadism becomes more common as men age. In adult men with HIV, hypogonadism is more likely and may occur at a younger age than in men without HIV.[81] Hypogonadism-related symptoms may negatively impact the quality of life by causing fatigue, depression, impaired concentration, sleep disturbance, and decreased libido.[81] Hypogonadism may also contribute to decreases in muscle mass, body hair, and bone mineral density. In addition, a retrospective analysis of 1,359 men with HIV showed a bidirectional association between low serum testosterone and multimorbidity syndrome, frailty, and HIV-associated non-AIDS comorbidities.[82] The HIVMA/IDSA Primary Care Guidance recommends testing for testosterone deficiency in men with any of the following: decreased libido, erectile dysfunction, reduced bone mass (or low-trauma fractures), weight loss, fatigue, or depression.[83,84] Testosterone replacement may be considered for persons with symptomatic hypogonadism; individuals receiving testosterone replacement therapy should be reevaluated with follow-up testosterone levels to assess for clinical improvement. Persons receiving testosterone therapy should be counseled about an increased risk of prostate cancer—testosterone should not be offered to men with prostate cancer or at high risk of prostate cancer.

Life Expectancy and Advanced Care Planning

Life Expectancy

Following the widespread use of potent combination antiretroviral therapy, the life expectancy of persons with HIV has dramatically increased.[2,3,85] In the NA-ACCORD cohort in the United States and Canada, investigators estimated that a person diagnosed with HIV at 20 years of age, during the years 2000 and 2007, could expect to live into their early 70s if they received effective antiretroviral therapy.[1] Subsequent studies have shown similar findings, with continued gains in survival.[2,85] As would be expected, with increasing longevity among persons with HIV who receive antiretroviral therapy, most individuals who die with HIV in the United States are older than 50 at the time of death. According to CDC HIV surveillance data, among all the deaths in the United States in 2022 among persons diagnosed with HIV, approximately 73% were 50 years of age and older (Figure 8).[22] These death statistics underscore the dramatic shift from the earlier years of the HIV epidemic, when most deaths occurred in persons younger than 40 years of age.

Advanced Care Planning

Earlier in the HIV epidemic, prior to the availability of potent combination antiretroviral therapy, advanced care planning was routinely integrated into HIV care.[30] Now that patients are leading longer, healthier lives, advanced care planning is often overlooked and underutilized.[86] Experts recommend that clinicians caring for older adults with HIV discuss end-of-life issues with these individuals, encourage them to designate a durable power of attorney for health care, and complete an advance health care directive, such as the state-specific Physicians Orders for Life Sustaining Treatment (POLST) forms.[30]

Summary Points

- Approximately 54% of all persons with diagnosed HIV in the United States are 50 years of age or older.
- Adults older than 50 years of age tend to underestimate their HIV risk acquisition.
- Compared with younger adults with HIV, older adults with HIV have higher rates of comorbid conditions and often take more non-antiretroviral medications.
- Antiretroviral therapy should be initiated in all persons with HIV, including individuals who are 50 years of age and older, regardless of CD4 cell count or HIV RNA level.
- Recommended antiretroviral therapy regimens for older adults with HIV are the same as for younger adults.
- Compared with younger adults with HIV, older adults with HIV have equally good rates of virologic suppression but less robust immune responses to antiretroviral therapy.
- Many of the common age-related, non-AIDS conditions play a major role in the clinical management of older persons with HIV.
- Clinicians caring for older persons with HIV should encourage them to designate a durable power of attorney for health care and complete a health care directive.

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Figures

Figure 1 (Image Series) - Models of Aging in Persons with HIV (Image Series) - Figure 1 (Image Series) - Models of Aging in Persons with HIV
Image 1A: Model of Accelerated Aging

This conceptual graphic illustrates accelerated HIV aging, in which age-associated comorbidities occur at an earlier age in persons with HIV than in the general population, but these comorbidities occur at roughly the same frequency (or rate) in persons with HIV and in the general population. Typical age-associated comorbidities include cardiovascular disease, cancer, diabetes, liver disease, frailty, and neurocognitive impairment.

Source: Image based on model from: Pathai S, Bajillan H, Landay AL, High KP. Is HIV a model of accelerated or accentuated aging? J Gerontol A Biol Sci Med Sci. 2014;69:833-42.

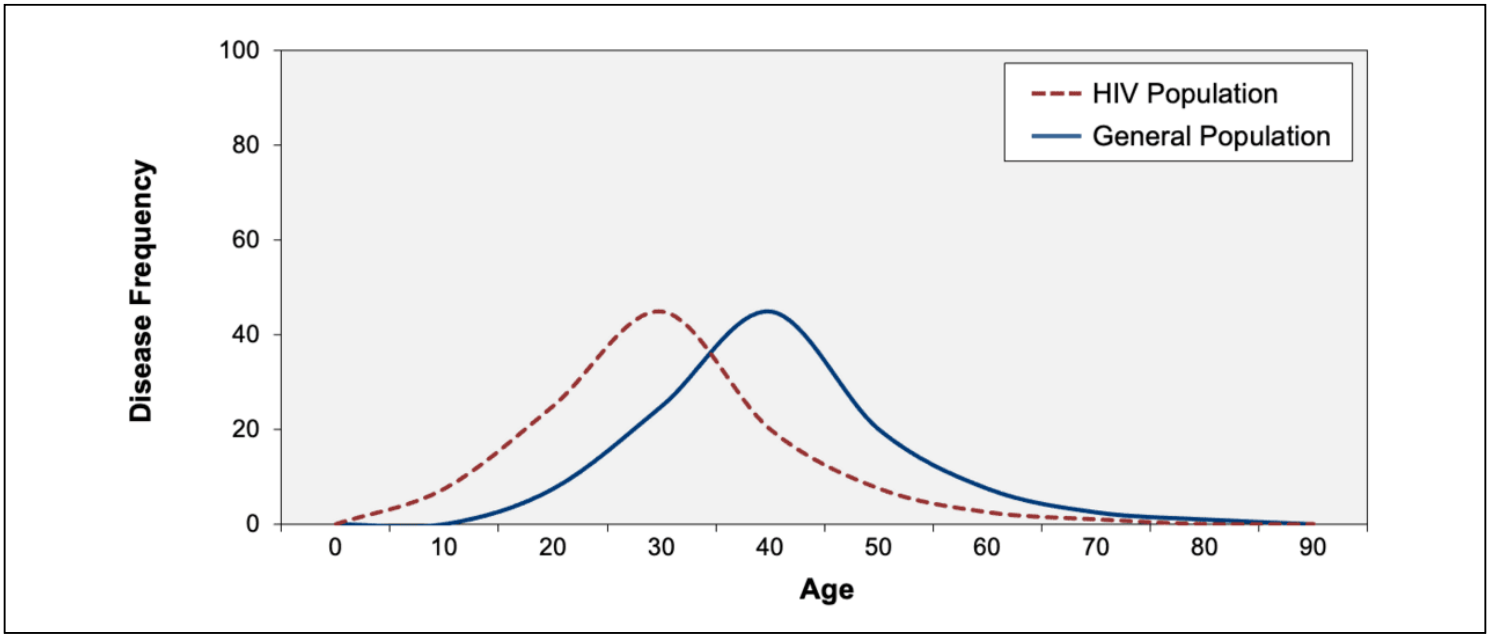


Figure 1 (Image Series) - Models of Aging in Persons with HIV
Image 1B: Model of Accentuated Aging

This conceptual graphic illustrates accentuated HIV aging, in which age-associated comorbidities occur at a significantly higher frequency (or rate) in persons with HIV when compared with persons in the general population, but at roughly the same age. Typical age-associated comorbidities include cardiovascular disease, cancer, diabetes, liver disease, frailty, and neurocognitive impairment.

Source: Image based on model from: Pathai S, Bajillan H, Landay AL, High KP. Is HIV a model of accelerated or accentuated aging? J Gerontol A Biol Sci Med Sci. 2014;69:833-42.

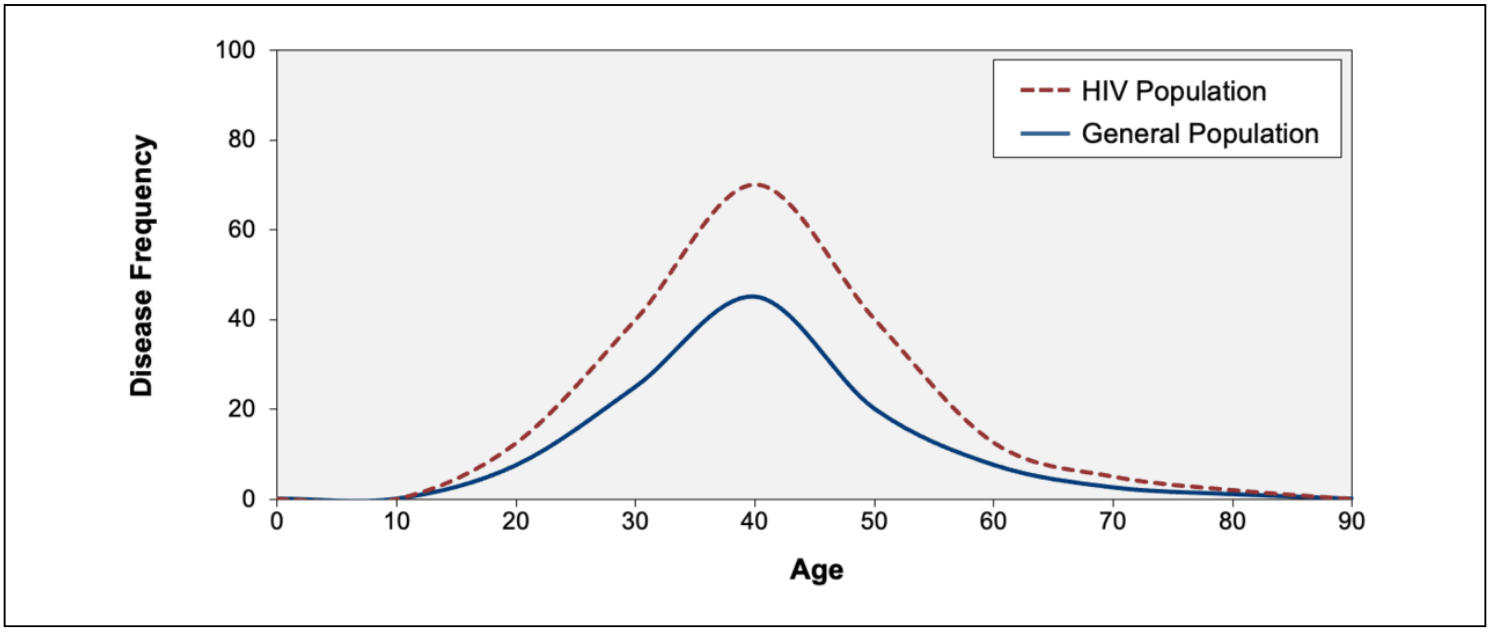


Figure 1 (Image Series) - Models of Aging in Persons with HIV
Image 1C: Model of Accelerated and Accentuated Aging

This conceptual graphic illustrates combined accelerated and accentuated HIV aging, in which age-associated comorbidities occur at a significantly earlier age and at a significantly higher frequency (or rate) in persons with HIV when compared with persons in the general population. Typical age-associated comorbidities include cardiovascular disease, cancer, diabetes, liver disease, frailty, and neurocognitive impairment.

Source: Image based on model from: Pathai S, Bajillan H, Landay AL, High KP. Is HIV a model of accelerated or accentuated aging? J Gerontol A Biol Sci Med Sci. 2014;69:833-42.

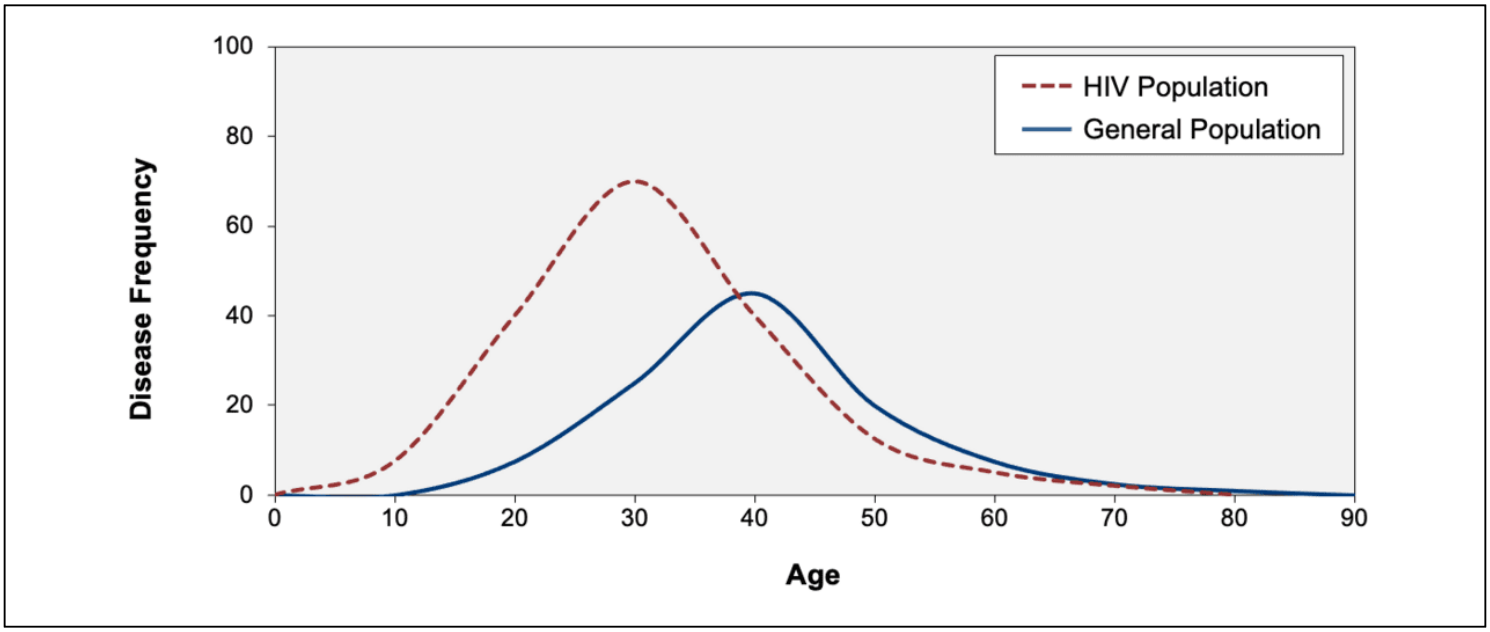


Figure 2 Persons with Diagnosed HIV in the United States, by Age Group, Year-End 2022

Source: Centers for Disease Control and Prevention. Diagnoses, deaths, and prevalence of HIV in the United States and 6 territories and freely associated states, 2022. HIV Surveillance Report, 2024; vol. 35:1-177. Published May 2024.

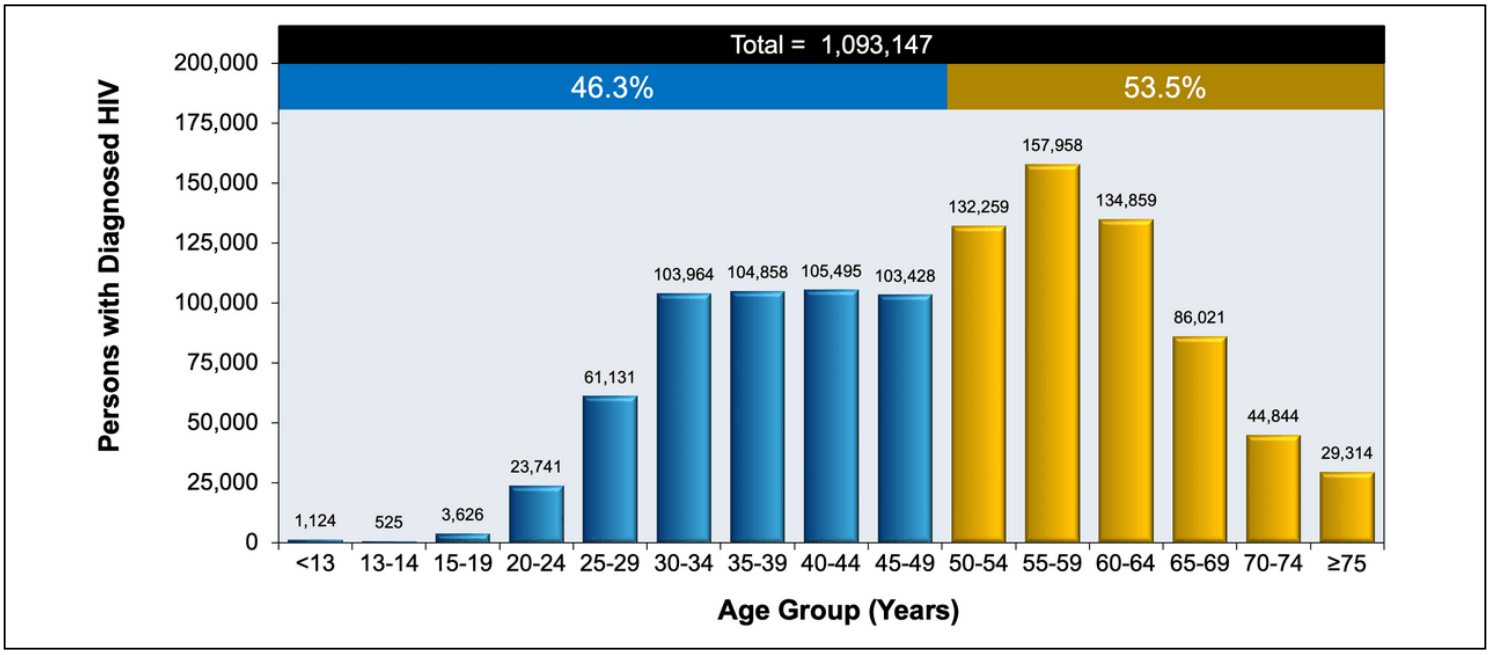


Figure 3 New Diagnoses of HIV in the United States by Age Group at Time of Diagnosis, 2022

Source: Centers for Disease Control and Prevention. Diagnoses, deaths, and prevalence of HIV in the United States and 6 territories and freely associated states, 2022. HIV Surveillance Report, 2024; vol. 35:1-177. Published May 2024.

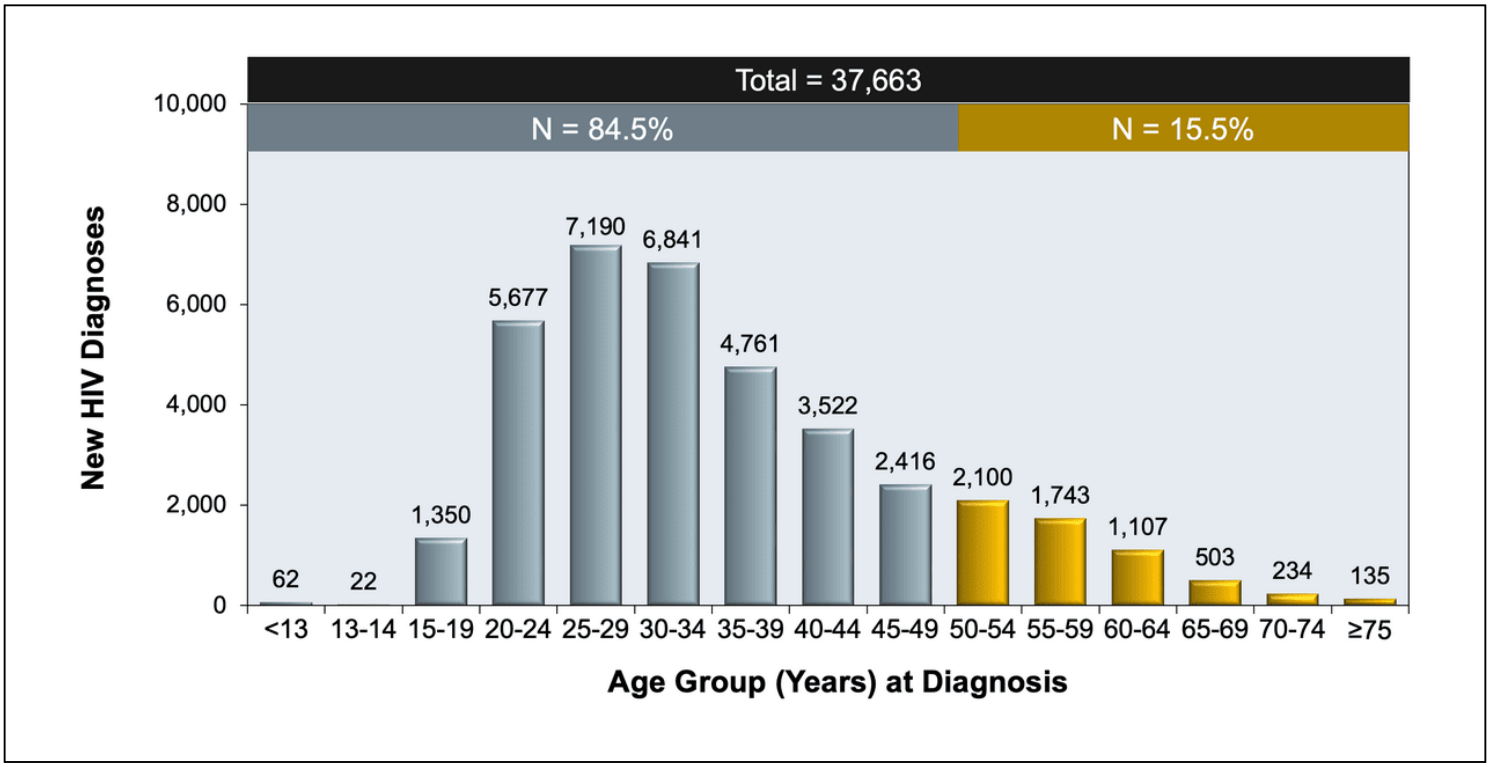


Figure 4 Percentage of Persons with Stage 3 (AIDS) at the Time of HIV Diagnosis, by Age Group, 2022

This graph shows that the likelihood of having stage 3 HIV at the time of HIV diagnosis increases with age.

Source: Centers for Disease Control and Prevention. Monitoring Selected National HIV Prevention and Care Objectives by Using HIV Surveillance Data—United States and 6 Dependent Areas, 2022. HIV Surveillance Supplemental Report. 2024;29(No. 2). Published May 2024.

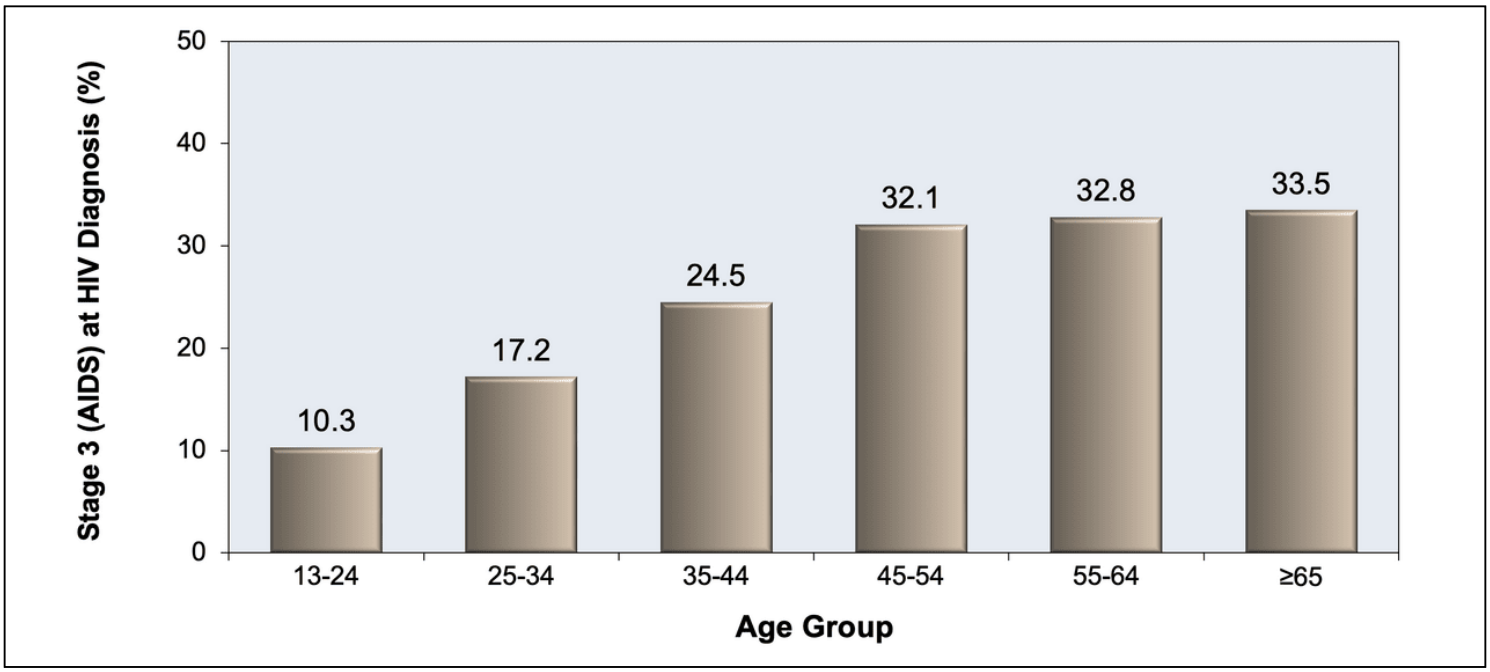


Figure 5 Awareness of HIV Status, by Age Group, United States, 2022

Source: Centers for Disease Control and Prevention. Estimated HIV Incidence and Prevalence in the United States, 2018–2022. HIV Surveillance Supplemental Report. 2024;29(No. 1):1-131. Published May 2024 (revised February 7, 2025).

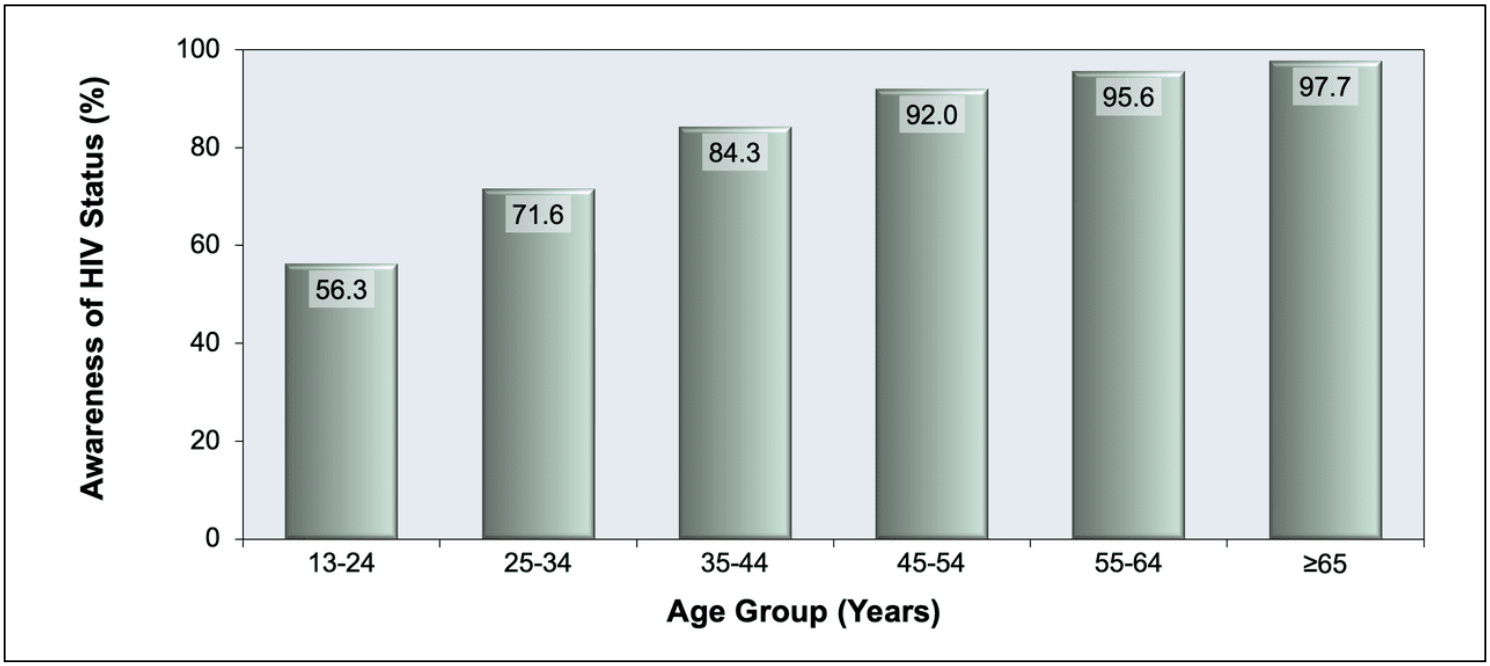


Figure 6 Rates of Viral Suppression in HIV Care Continuum Outcomes, by Age, United States, 2022

Source: Source: Centers for Disease Control and Prevention. Monitoring Selected National HIV Prevention and Care Objectives by Using HIV Surveillance Data—United States and 6 Dependent Areas, 2022. HIV Surveillance Supplemental Report. 2024;29(No. 2). Published May 2024.

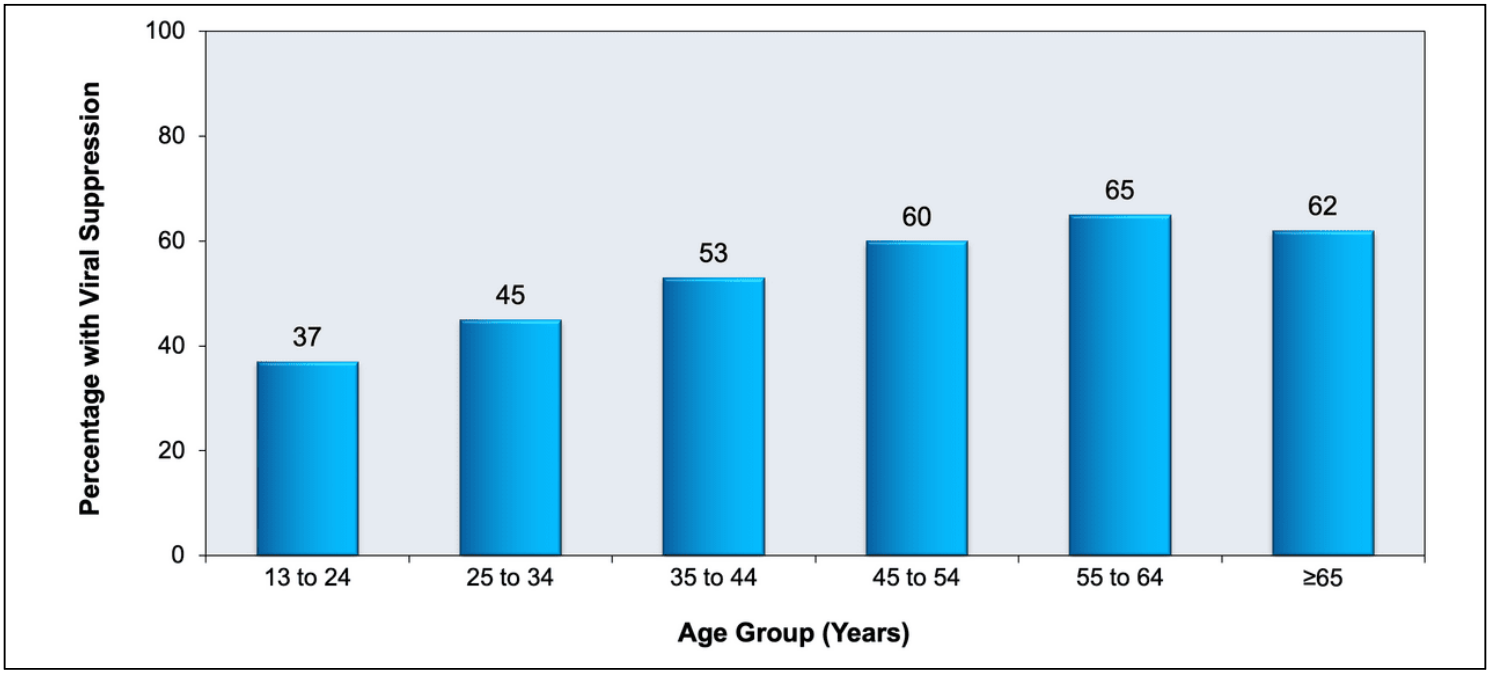


Figure 7 Risk of Acute Myocardial Infarction Based on HIV Status and Age

This graph is based on data from 82,459 participants in the Veterans Aging Cohort Study (Virtual Cohort) from April 1, 2003 through December 31, 2009. Persons with HIV clearly had a higher risk of developing acute myocardial infarction and this risk was seen across multiple decades of age.

Source: Freiberg MS, Chang CC, Kuller LH, et al. HIV infection and the risk of acute myocardial infarction. JAMA Intern Med. 2013;173:614-22.

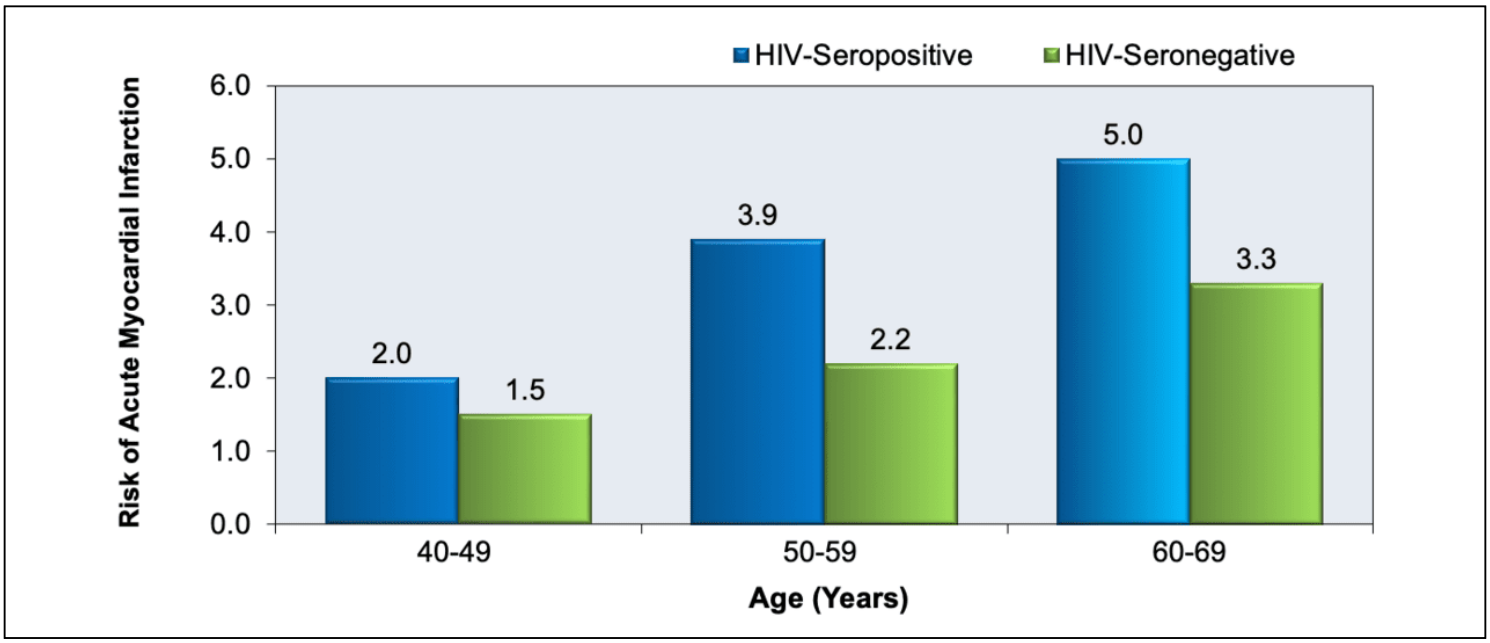


Figure 8 Deaths in Persons with Diagnosed HIV, by Age Group, United States, Year-End 2022

Source: Centers for Disease Control and Prevention. Diagnoses, deaths, and prevalence of HIV in the United States and 6 territories and freely associated states, 2022. HIV Surveillance Report, 2024; vol. 35:1-177. Published May 2024.

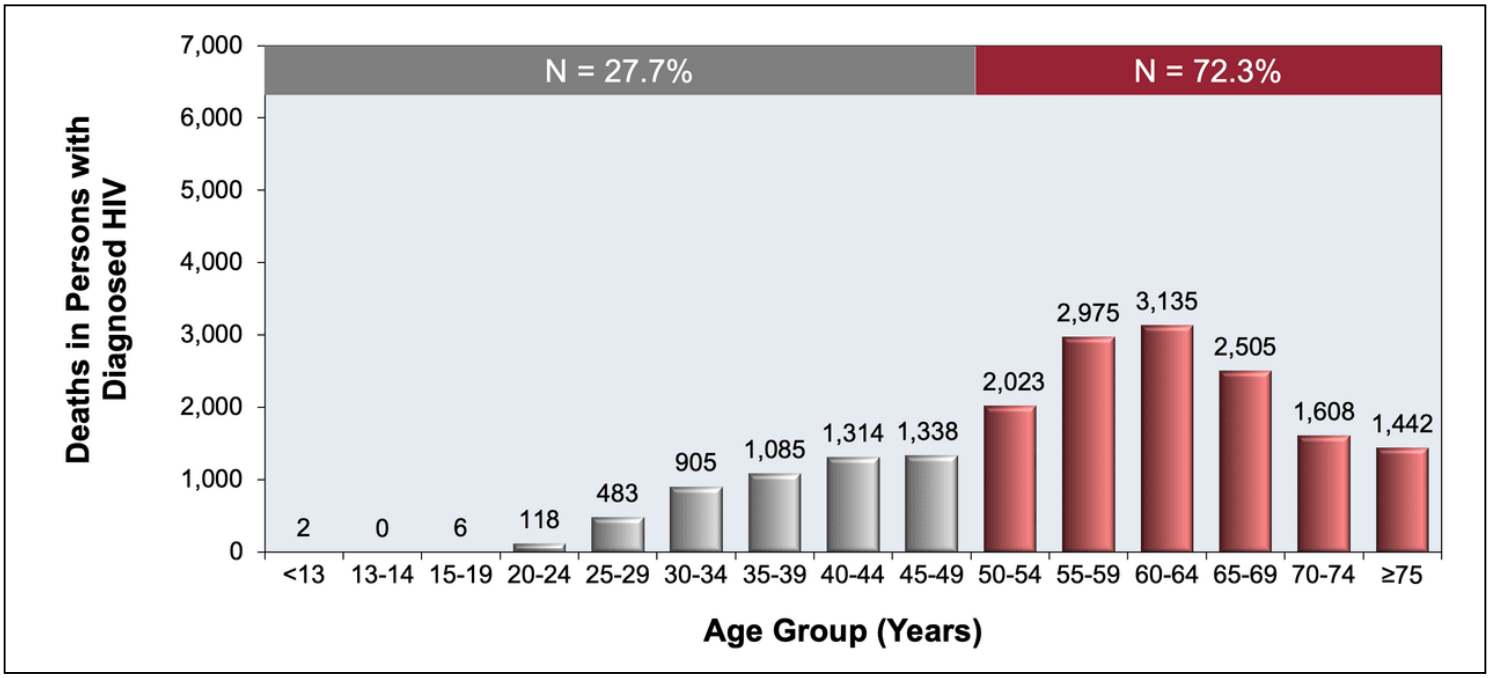


Table 1. Recommended Initial Regimens for Most People with HIV: Adult and Adolescent ARV Guidelines

Panel's Recommendations
Recommended regimens are those with demonstrated durable virologic efficacy, favorable tolerability and toxicity profiles, and ease of use. Choice of antiretroviral therapy during pregnancy should be guided by recommendations from the Perinatal Guidelines.
For people who do NOT have a history of long-acting cabotegravir use as HIV preexposure prophylaxis (PrEP), the following regimens are recommended[a]: • Bictegravir-tenofovir alafenamide-emtricitabine (AI) • Dolutegravir plus (tenofovir alafenamide or tenofovir DF)[b] plus (emtricitabine or lamivudine) (AI) • Dolutegravir-lamivudine (AI), except for the following individuals: ◦ With hepatitis B virus (HBV) coinfection, *or* ◦ With unknown HBV serostatus, *or* ◦ Without results of HIV genotypic resistance testing for reverse transcriptase, *or* ◦ Rapid antiretroviral therapy initiation is planned.
For people with HIV and a history of using long-acting cabotegravir as HIV PrEP, integrase genotypic drug resistance testing should be done before starting integrase strand transfer inhibitor (INSTI)-based antiretroviral therapy. If treatment is to be started before results of genotypic testing, the following regimen is recommended: • Darunavir (boosted with cobicistat or ritonavir) plus (tenofovir alafenamide or tenofovir DF)[b] plus (emtricitabine or lamivudine)—pending the results of the genotype test (AIII).
[a]Because of the current low rates of transmitted INSTI resistance in the United States, even when there is suspicion that HIV was acquired from a partner with virologic failure while on an INSTI, an INSTI-based regimen can be started pending the results of the INSTI genotype. [b]Tenofovir alafenamide and tenofovir DF are two forms of tenofovir approved by the FDA. Tenofovir alafenamide has fewer bone and kidney toxicities than tenofovir DF, whereas tenofovir DF is associated with lower lipid levels. Safety, cost, and access are among the factors to consider when choosing between these drugs. *Rating of Recommendations: A = Strong; B = Moderate; C = Weak* *Rating of Evidence: I = Data from randomized controlled trials; II = Data from well-designed nonrandomized trials, observational cohort studies with long-term clinical outcomes, relative bioavailability/bioequivalence studies, or regimen comparisons from randomized switch studies; III = Expert opinion*

Source:

- Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the Use of Antiretroviral Agents in Adults and Adolescents with HIV. Department of Health and Human Services. What to Start. Initial Combination Antiretroviral Regimens for People With HIV. September 24, 2026. [HIV.gov]