Cardiovascular Risk Assessment for Persons Living With HIV

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Systematic assessment of cardiovascular risk among persons living with HIV (PLWH) has become more important as HIV survival has increased. Since the advent of effective antiretroviral therapy (ART), PLWH often enjoy life expectancies equal to those of the general population. PLWH then share the same comorbidities as the general population, with some increased risks due to HIV and ART. One comorbidity, cardiovascular disease, is the leading cause of death in the United States. As the current population of PLWH ages, reducing cardiovascular risk will become even more important. Before cardiovascular risk reduction can take place, providers must first know the patient's risks. This paper describes the importance of cardiovascular risk assessment for PLWH based on current literature and presents findings from a quality-improvement (QI) initiative designed to implement systematic cardiovascular assessment using the Framingham Risk (FR) for PLWH in an infectious-disease practice.

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Persons living with HIV (PLWH) may have increased cardiovascular risk compared to the general population due to HIV disease itself and the use of long-term antiretroviral therapy (ART) that can increase other traditional risk factors such as hyperlipidemia and hyperinsulinemia (Aberg, 2009; Hardwicke, Lewis, & Grimes, 2010; Kannel & Giordano, 2004; Law et al., 2006; Randell & Moyle, 2009). However, modified cardiovascular risk equations have not been validated for use in the HIV-infected population. Recent introduction of an algorithm that accounts for exposure to ART has been released, but it has not been externally validated and is therefore not currently appropriate for use with PLWH (Friis-Moller et al., 2010). Development and validation of such models may be difficult due to inability to differentiate risks associated with HIV, ART, and traditional risk factors, as most PLWH will receive ART through the course of treatment (Schambelan et al., 2008), and other risk factors such as smoking (Kwong & Bouchard-Miller, 2010) and dyslipidemia (McGoldrick & Leen, 2007) are higher among PLWH than in the general population.

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In addition, an aging HIV population is of increasing concern, and studies examining the aging population with regard to cardiovascular events are lacking. However, the lack of HIV-specific cardiovascular risk algorithms should not prevent screening for traditional cardiovascular risk factors among PLWH. Current smoking (but not past smoking) tripled the death risk (Modrich et al., 2009), and dyslipidemia among PLWH on ART increased cardiovascular risk by 50% (Grover, Coupal, Gilmore, & Mukherjee, 2005). Significant risk factors for cardiovascular-related mortality among HIV-infected patients include diabetes mellitus (DM), hypertension (HTN), smoking, and age; focus on modifiable risk factors can help to reduce cardiovascular-related mortality among PLWH (Smith, 2009).

The Framingham Risk (FR) assessment has performed reasonably well when applied to PLWH (Schambelan et al., 2008). When compared to similar cardiovascular screening tools, research is nondefinitive (Das, 2010) and has suggested that the FR score is more sensitive than other measures (Lima et al., 2009). While the FR formula may slightly underpredict risk through inability to account for ART exposure and HIV disease itself (Parra et al., 2010), it is nonetheless a useful screening tool (Hardwicke et al., 2010). Three published guidelines recommend evaluation and management of cardiovascular risk among PLWH. Guidelines from the European AIDS Clinical Society (Lundgren et al., 2008) suggested that PLWH would experience age-related cardiovascular events and, therefore, cardiovascular risk should be assessed systematically. Both the HIV Medicine Association of the Infectious Disease Society of America and the Adult AIDS Clinical Trials Group have stated that if there are a minimum of two cardiovascular risk factors, systematic evaluation should be performed using the FR algorithm before initiating ART and a minimum of annually thereafter (Dube et al., 2003).

In addition to evidence from clinical practice guidelines, several studies have demonstrated concordance between subclinical artherosclerosis and FR. For example, FR has been correlated with carotid intima-media thickness, a measure of subclinical atherosclerosis (Parra et al., 2010). FR score is associated with coronary plaque burden in HIV-infected men (Lo et al., 2010) and has been shown to have good positive predictive value for identifying male patients with moderate cardiovascular risk (Knobel et al., 2007). Among HIV-infected patients, those with higher FR scores showed a significantly higher intima-media thickness and prevalence of carotid lesions than those with low FR scores (Calza et al., 2009). Educating adults about global coronary risk using a tool like the FR was found to improve accuracy of risk perception, which may increase intent to initiate cardiac prevention (including lifestyle changes) among adults at moderate to high risk (Sheridan et al., 2010).

Framingham Risk Calculations

Framingham Risk analysis classifies a patient's risk of myocardial infarction (MI) or sudden cardiac death within the next 10 years. A live link to the calculator may be accessed at http://hp2010.nhlbihin.net/atpiii/calculator.asp?usertype=prof. The FR score may be used on patients ages 20 and older and is calculated based on a patient's age, gender, total cholesterol, high-density lipoprotein (HDL) cholesterol, systolic blood pressure (BP), whether the patient is currently on antihypertensive medication, and whether the patient has smoked any cigarettes in the previous month. It is important to note that, because of a larger database, Framingham estimates are more robust for total cholesterol than for low-density lipoprotein (LDL) cholesterol. However, LDL cholesterol remains the primary target of therapy (National Institutes of Health, 2002). Patients fall into three categories: <10% risk, 10%–20% risk, and >20% risk (see Table 1). If a patient has a cardiovascular risk equivalent such as personal history of coronary artery disease, cerebrovascular incident, DM, transient ischemic attack, abdominal aortic aneurysm, peripheral artery disease, or chronic kidney disease with a glomerular filtration rate higher than 45, then he or she is automatically placed in the highest risk category of a greater-than-20% risk (George et al., 2010; National Institutes of Health, 2002). For each risk category, there are recommended cholesterol targets and suggested serum LDL values at which to either begin therapeutic lifestyle counseling (TLC) and/or pharmacotherapy with lipid-lowering agents (see Table 1).