

## Editorial on Mortality

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Dramatic declines in HIV-related mortality have been achieved by increasing access to combination antiretroviral therapy (ART) in Western countries; however, when pooled mortality rates from people living with HIV (PLWH) worldwide are compared with those of the general population, PLWH are 15 times more likely to experience early death [1-3].

In Miami-Dade County, where the use of cocaine is frequent among PLWH and the incidence of HIV is the highest in the United States [4], cocaine use has been associated with increased mortality in the Miami Adult Studies on HIV (MASH) cohort [5]. Cocaine use was associated with, HIV-related mortality and cardio-pulmonary deaths, the two main causes of death in this report [5].

The results from the MASH cohort suggest that cocaine use may precipitate death in this population through behavioral and biological effects [5-10]. Behavioral factors such as engaging in illegal and addictive drug use will lessen the possibility of early HIV testing, and reduce the potential for accessing and adhering to antiretroviral treatment. Drug users tend to present for HIV testing late in the disease, when symptoms are already apparent [6], they miss treatment appointments more frequently and have decreased adherence to treatment and higher HIV viral load therefore, they are more exposed to rapid HIV disease progression and death [7, 8].

Biological effects of cocaine use such as overdose, cardiovascular and pulmonary events and progression of liver disease increase morbidity and mortality in this population [5, 9, 10]. PLWH who use cocaine are at a higher risk of cocaine overdose, as well as toxicity by other additives/contaminants of the illegal drug. In the MASH cohort, two of the deaths were related to cocaine overdose [5]. Cocaine use also increases the risk of cardiovascular events such as myocardial infarction, stroke, or cardiac arrest, as well as pulmonary conditions such as acute eosinophilic pneumonia, pneumothorax, pneumomediastinum, diffuse alveolar hemorrhage (DAH), pulmonary hypertension and granulomatosis [9, 10]. Cardio-pulmonary events are a frequent non-HIV cause of death in PLWH in the MASH cohort as well as in other epidemiological reports [5, 11, 12].

HIV-seropositive drug users also have an increased risk for hepatitis C viral infection (HCV); 29% of the MASH cohort was co-infected with HIV and HCV. In addition to HIV/HCV co-infection,

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the HIV virus itself and cocaine use seem to accelerate liver fibrosis progression, which was associated with mortality in the MASH cohort [5].

To make a difference in mortality rates in Miami-Dade County, it is urgent to consider addressing the problem of cocaine use from the time of HIV diagnosis, and create an environment where the healthcare disparities for PLWH who use illegal drugs are diminished or eliminated. Achieving this will take profound socio-economic changes. Referrals to substance detoxification programs and close monitoring of treatments that use case managing and technological interventions need to be implemented to reach this difficult-to-reach population. Effective substance abuse treatment will also improve their participation in their continuum of care. The success rate of detoxification programs measured by cessation and/or less frequent relapses, need to be increased. In order to achieve this endeavor, future research studies on the success of these programs should include models that relate patients' characteristics and behaviors with patterns of cocaine use. We need to develop studies that follow these programs longitudinally, and measure cessation, relapses, adherence to ART, HIV viral control, morbidity and mortality as synergistic outcomes.

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