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SPECIAL FEATURE: HEPATITIS C VIRUS

Updating the Infection Risk Reduction Hierarchy: Preventing Transition into Injection

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ABSTRACT *Current approaches to prevention of blood-borne infections in injection drug users include referral to drug abuse treatment, access to sterile syringes, bleach disinfection of injection equipment, and education about not sharing equipment. However, rates of some blood-borne infections (e.g., hepatitis C virus) remain elevated among injection drug users, especially early after initiation into injection drug use. With lower infection rates in noninjectors and transition into injection drug use occurring most commonly among these noninjectors, prevention of transition into injection drug use as an additional step to reduce risk for acquisition and transmission of blood-borne infections merits closer attention.*

KEYWORDS *Hepatitis C virus, Hierarchy, Human immunodeficiency virus, Infection, Injection drug use, Prevention.*

For prevention of human immunodeficiency virus (HIV) and other blood-borne infections among injection drug users, the traditional approach to prevention has been to encourage abstinence facilitated with drug abuse treatment; for injection drug users who could or would not quit use, the approach has been to use brand new sterile needles and syringes, then safely discard used equipment with each injection. Should sterile needles and syringes be unavailable, then not sharing equipment and disinfection of equipment with bleach are recommended. This hierarchy of prevention has been in place and is part of the recommendations issued by the US Public Health Service.[1]

The basis for these recommendations was the recognition that transmission of blood-borne infections among substance users occurred primarily through multiple reuse of syringes,[2,3] and that such reuse was caused by both ritual behavior involving sharing of needles and legal and economic barriers to sterile syringe access.[4,5] Along with the expansion of drug abuse treatment programs and the advent of needle-exchange programs or expanded syringe access through pharmacies,[6] considerable headway has been made in the reduction of incidence of HIV infection among injection drug users.

Although HIV rates among injection drug users have subsided in many US and European cities,[7] continued high incidence of other blood-borne infections remains

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a problem. Rates of hepatitis C virus (HCV) and, despite availability of an effective vaccine, hepatitis B virus (HBV) infection in injection drug users are typically above 10/100 person-years and can exceed 35/100 person-years in the first several years after initiating injection.[8–13] Approaches are needed to address reduction of blood-borne infection in this population.

Continuing high rates of hepatitis B and C virus infection in injection drug users, even in communities, have shown declines in HIV infection related to a number of factors. First, levels of HBV and HCV viral loads exceed those measured for HIV infection,[14] suggesting a higher efficiency in transmission. Second, several studies have shown that rates of transmission are elevated within the first few years after initiation into injection, during a period of time when individuals are less likely to self-identify as injection drug users and therefore seek prevention and treatment services.[15,16] Predictors of entering methadone maintenance and characteristics of persons attending needle-exchange programs tend to include persons with an average of 10 years of substance use,[17,18] which is long after the first several years of injection drug use, when many of these users become infected with HBV and HCV. Third, recent studies have implicated drug preparation practices, such as sharing cookers, in which drugs are mixed with water and heated, and sharing cotton, which is used to filter out particulate matter, as sources for transmission of HBV and HCV infection.[19,20] Other practices have been studied, including reuse of rinse water between injections that becomes contaminated with blood, and "backloading," which involves splitting drugs prepared in one cooker with transfer of prepared drug from one syringe (which may be contaminated) to a second syringe. Others have mentioned that reuse of blood-tinged tourniquets might be a source of contamination for transfer of HBV or HCV.[21]

Although there are numerous possible mechanisms for parenteral transmission of HBV and HCV infection, such a detailed list of changes in practices is daunting for persons who are already disrupted by heavy drug dependence. Adoption of effective prevention practices is more likely when advice is uncomplicated through modest sets of instructions. Recommending drug treatment and, for those who will not or cannot stop drug use, single use of sterile syringes is easy, but the addition of consistent use of sterile cookers, cottons, clean rinse water, new tourniquets, and so on is probably beyond what can be expected, especially for those who are homeless and otherwise lacking resources.

Another approach to consider for reducing incidence of HBV infection is more extensive use of HBV vaccine. While safe and effective vaccines have been available for over two decades, rates of vaccination among substance users remain low.[22,23] Programs that offer vaccine have shown that high completion rates can be achieved.[24,25] Additional efforts are needed to achieve adequate levels. Improved access for individuals who are at risk but uninfected needs to be developed and implemented. Given that the risk for infection is high early after initiation into injection drug use, persons need to be accessed early or even before they initiate injection drug use.

In the absence of a vaccine for HCV infection, behavioral approaches are needed. Because the risk for infection is highly associated with injection drug use and the risk is particularly high after initiation of injection, approaches are needed that access these drug users early or even before they initiate injection drug use. In our experience, accessing new-onset injection drug users is difficult, either directly or through more experienced peers. Even with access, the epidemiology and behavioral studies suggest multiple routes (e.g., sharing of needles, cookers, cottons, rinse

water, backloading) may be involved, so instruction is likely to be complex and tedious; consistent success is difficult to achieve.

Several groups have started to examine risk factors for initiation into injection drug use.[26–28] Several findings are noteworthy. First, injection drug users tend to transition from using noninjection drugs such as snorted heroin and cocaine or the use of crack; although some transition without using these drugs, over 85% do.[29] When these new transition injection drug users were compared to their age-appropriate peers who responded to the National Household Survey on Drug Abuse,[30] they were much more likely to have sniffed, snorted, or smoked heroin and cocaine (including crack), with the usage rates of marijuana, hallucinogens, and inhalants similar. Similarly, the proportions of the national survey sample that used noninjection forms of heroin and cocaine were under 3%.

Together, these data suggest that messages targeted to prevent transition to injection drug use can be efficiently targeted within the population to a tiny subsample at high risk for transition. This subsample consists of persons who have already started noninjection drug use. Currently, outreach efforts to educate this population about risk for health problems and treatment options have lagged behind efforts for injection drug users. Second, prevalence of HCV infection of 52% in recent-onset injectors has been reported[31]; we have shown,[32] among a sample of heroin and cocaine noninjectors from the same community, that the prevalence was 5%, which is consistent with other studies showing that rates of HCV (as well as HIV) are considerably higher in injectors than noninjectors. In New York City, the estimated incidence of HCV infection was 10–35/100 person-years for new-onset injectors, and 0.45/100 person-years for a cohort of noninjectors followed in the same community.[33]

These data suggest that an important message for HCV prevention that can be achieved through outreach to noninjection drug users is to prevent transition into injection drug use. Although the most important message might be cessation of substance use altogether, a secondary message would be to emphasize the importance of not transitioning into injection. Most of HCV and much of HBV and HIV as well as other blood-borne infections could be prevented by stopping transition into injection drug use.

Preventing transition into injection drug use is not the same as primary prevention of substance use. Programs have been started in communities to prevent initial use of any illicit substances, with varying levels of success.[34] Clearly, success in these programs would be important for public health and needs to be encouraged. Prevention of transition into injection is a more focused effort to reach persons who have already started noninjection drugs and may already be dependent. The goal of transition prevention is to reduce or limit consequences of substance use and abuse that have already started, but have not yet progressed to injection. They are not contradictory, and both are part of a comprehensive program for infection prevention.

Resistance to achievement of preventing transition into injection from noninjection drug use is a problem that needs to be considered. One of the main reasons for transition is that injection is more efficient for dose delivery than sniffing or smoking (for which part of the dose flakes or wafts away), and injection becomes more enticing when the purity of drug drops or the cost of the drug escalates. In New York City, the current high purity and low cost of illicit drugs[35] make transition prevention messages more palatable; how long these conditions will remain is unknown. The message is probably reasonable to try for persons who have not yet transitioned because they have yet to experience injection, and risk of consequences might be ingrained without the trade-off of experience of injection and what that entails.

The message would appear relevant also to injection drug users who test negative for HCV and other blood-borne infections; however, this is complicated for several reasons. First, resistance to this message is likely to be higher for current injectors because the issue of efficiency of dose delivery would be expected to be a more formidable trade-off for the experienced injector (than the uninitiated) to make. The type of drug, cocaine and heroin, may present additional important differences. For example, the ease of getting heroin injectors to switch to snorting or "chasing the dragon" (i.e., inhaled smoke) is unknown, but likely easier than doing the same for cocaine injectors, particularly for smoking crack, which has a negative image among many users. Also, primary prevention of injection is ethically more clear than changing from injection to noninjection because, although injection is associated with considerable risks for blood-borne infections, noninjection is not without risks (such as increasing the risk for pneumonia).[36]

Another concern to consider for injection prevention messages is whether telling a noninjector that he or she can reduce the risk for consequences of drug use will produce a lower likelihood of curtailing drug use. The reasoning behind this concern might be that telling a person that he or she can avoid consequences by continuing what he or she currently does could have an unintended reinforcing message. The argument is flawed for several reasons. First, the transition prevention message, like primary substance abuse prevention, educates people about risks to avoid for behaviors they have not started (or if they are at the experimental early phases, have not yet suffered consequences). This does not condone current lifestyle choices, but educates about directions to avoid that have even greater consequences. Second, the experience with needle exchange with injection drug users started with concerns that education about options might result in higher or more sustained levels of drug use; these concerns were not borne out during evaluations across multiple programs.[6] Together, these considerations suggest that transition prevention messages coupled with education about consequences of noninjection drug use and options for treatment would represent a direction in prevention of infections that is more comprehensive than approaches currently used.

Efforts to develop interventions to prevent initiation or relapse into injection have been scant.[37–39] One randomized trial demonstrated effectiveness even with a limited sample size[39]; however, consideration of widespread testing of transition prevention messages has yet to receive adequate attention. The case for improving information about identification of persons at risk for initiation into injection to develop and evaluate new interventions to prevent transition makes sense, and the time to move forward with this is now.

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