TRANSMISSION THROUGH INJECTION DRUG USE

HIV can be transmitted to injection drug users (IDUs) who are exposed to HIV while sharing injection paraphernalia such as needles, syringes, the water in which drugs are mixed, or the cotton through which drugs are filtered. Parenteral transmission of HIV during injection drug use does not require IV puncture; SC ("skin popping") or IM ("muscling") injections can transmit HIV as well, even though these behaviors are sometimes erroneously perceived as low-risk. Among IDUs, the risk of HIV infection increases with the duration of injection drug use; the frequency of needle sharing; the number of partners with whom paraphernalia are shared, particularly in the setting of "shooting galleries" where drugs are sold and large numbers of IDUs may share a limited number of "works"; comorbid psychiatric conditions such as antisocial personality disorder; the use of cocaine in injectable form or smoked as "crack"; and the use of injection drugs in a geographic location with a high prevalence of HIV infection, such as certain inner-city areas in the United States. As noted in Table 226-3, the per-act risk of transmission from injection drug use with a contaminated needle has been estimated to be approximately 0.6%.

TRANSMISSION BY TRANSFUSED BLOOD AND BLOOD PRODUCTS

HIV can be transmitted to individuals who receive HIV-tainted blood transfusions, blood products, or transplanted tissue. The first cases of AIDS among transfusion recipients and individuals with hemophilia or other clotting disorders were reported in 1982. The vast majority of HIV infections acquired via contaminated blood transfusions, blood components, or transplanted tissue in resource-rich countries occurred prior to the spring of 1985, when mandatory testing of donated blood for HIV-1 was initiated. It is estimated that >90% of individuals exposed to HIV-contaminated blood products become infected (Table 226-3). Although blood screening for HIV is becoming more universal even in the developing world, unfortunately, in some resource-poor countries, HIV continues to be transmitted by blood, blood products, and tissues due to inadequate screening. Transfusions of whole blood, packed red blood cells, platelets, leukocytes, and plasma are all capable of transmitting HIV infection. In contrast, hyperimmune gamma globulin, hepatitis B immune globulin, plasma-derived hepatitis B vaccine, and Rh_o immune globulin have not been associated with transmission of HIV infection. The procedures involved in processing these products either inactivate or remove the virus.

Currently, in the United States and in most developed countries, the following measures have made the risk of transmission of HIV infection by transfused blood or blood products extremely small: the screening of blood donations for antibodies to HIV-1 and HIV-2 and determination of the presence of HIV nucleic acid usually in mini-pools of several specimens; the careful selection of potential blood donors with health history questionnaires to exclude individuals with risk behavior; and opportunities for self-deferral and the screening out of HIV-negative individuals with serologic testing for infections that have shared risk factors with HIV, such as hepatitis B and C and syphilis. The chance of infection of a hemophiliac via clotting factor concentrates has essentially been eliminated because of the added layer of safety resulting from heat treatment of the concentrates. It is currently estimated that the risk of infection with HIV in the United States via transfused screened blood is approximately 1 in 2 million units. Therefore, since ~16 million donations are collected in the United States each year, despite the best efforts of science, one cannot completely eliminate the risk of transfusion-related transmission of HIV. In this regard, a case of transfusion-related transmission of HIV was reported in the United States in 2010, which was tracked to a blood donation in 2008; this was the first such reported case since 2002. Transmission of HIV (both HIV-1 and HIV-2) by blood or blood products is still an ongoing threat in certain developing countries, particularly in sub-Saharan Africa, where routine screening of blood is not universally practiced. In other countries, there have been reports of sporadic breakdowns in routinely available screening procedures in which contaminated blood was allowed to be transfused, resulting in small clusters of patients becoming infected. For example, in China in the 1990s, a disturbingly large number of persons became infected by selling blood in situations where the collectors reused needles that were contaminated and, in some instances, mixed blood products from a number of individuals, separated the plasma, and reinfused mixed red blood cells back into the individual donors.

OCCUPATIONAL TRANSMISSION OF HIV: HEALTH CARE WORKERS, LABORATORY WORKERS, AND THE HEALTH CARE SETTING

There is a small but definite occupational risk of HIV transmission to health care workers and laboratory personnel and potentially others who work with HIV-containing materials, particularly when sharp objects are used. An estimated 600,000 to 800,000 health care workers are stuck with needles or other sharp medical instruments in the United States each year. The global number of HIV infections among health care workers attributable to sharps injuries has been estimated to be 1000 cases (range, 200–5000) per year. As of 2010, there had been 57 documented cases of occupational HIV transmission to health care workers in the United States and 143 possible transmissions. There have been no confirmed cases reported since 1999.

Exposures that place a health care worker at potential risk of HIV infection are percutaneous injuries (e.g., a needle stick or cut with a sharp object) or contact of mucous membrane or nonintact skin (e.g., exposed skin that is chapped, abraded, or afflicted with dermatitis) with blood, tissue, or other potentially infectious body fluids. Large, multi-institutional studies have indicated that the risk of HIV transmission following skin puncture from a needle or a sharp object that was contaminated with blood from a person with documented HIV infection is ~0.3% and after a mucous membrane exposure it is 0.09% (see "HIV and the Health Care Worker," below) if the injured and/or exposed person is not treated within 24 h with antiretroviral drugs. The risk of hepatitis B virus (HBV) infection following a similar type of exposure is ~6–30% in nonimmune individuals; if a susceptible worker is exposed to HBV, postexposure prophylaxis with hepatitis B immune globulin and initiation of HBV vaccine is >90% effective in preventing HBV infection. The risk of HCV infection following percutaneous injury is ~1.8% **(Chap. 360)**.

Rare HIV transmission after nonintact skin exposure has been documented, but the average risk for transmission by this route has not been precisely determined; however, it is estimated to be less than the risk for mucous membrane exposure. Transmission of HIV through intact skin has not been documented. Currently in developed countries, virtually all puncture wounds and mucous membrane exposures in health care workers involving blood from a patient with documented HIV infection are treated prophylactically with combination antiretroviral therapy (cART). This practice, referred to as *postexposure prophylaxis* or PEP, has dramatically reduced the occurrence of puncture-related transmissions of HIV to health care workers.

In addition to blood and visibly bloody body fluids, semen and vaginal secretions also are considered potentially infectious; however, they have not been implicated in occupational transmission from patients to health care workers. The following fluids also are considered potentially infectious: cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, and amniotic fluid. The risk for transmission after exposure to fluids or tissues other than HIV-infected blood also has not been quantified, but it is probably considerably lower than the risk after blood exposures. Feces, nasal secretions, saliva, sputum, sweat, tears, urine, and vomitus are not considered potentially infectious for HIV unless they are visibly bloody. Rare cases of HIV transmission via human bites have been reported, but not in the setting of occupational exposure.

An increased risk for HIV infection following percutaneous exposures to HIV-infected blood is associated with exposures involving a relatively large quantity of blood, as in the case of a device visibly contaminated with the patient's blood, a procedure that involves a hollow-bore needle placed directly in a vein or artery, or a deep injury. Factors that might be associated with mucocutaneous transmission of HIV include exposure to an unusually large volume of blood and prolonged contact. In addition, the risk increases for exposures to blood from untreated patients with advanced-stage disease or those patients in the acute stage of HIV infection, owing to the higher levels of HIV in the blood under those