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# Investigation of Patients Treated by an HIV-Infected Cardiothoracic Surgeon --- Israel, 2007

Transmission of human immunodeficiency virus (HIV) from an infected health-care worker to patients is rare (*1*), with the greatest potential for occurrence during exposure-prone, invasive surgical procedures in which the blood of the health-care worker might come into contact with patients' blood or mucous membranes. When a surgeon is discovered to have HIV infection, a decision must be made about notification of patients, but only limited data are available to guide decision-making. Such notifications generally are decided upon on a case-by-case basis, taking into account such factors as the nature of the procedures performed, the infection-control knowledge and practices of the infected surgeon, the presumed likelihood of transmission, and available resources (*2*). This report describes the case of a cardiothoracic surgeon in Israel specializing in open-heart procedures (coronary artery bypass grafting and valve surgery) who was found to be HIV positive in January 2007 during evaluation for fever of recent onset. The duration of infection was unknown. A lookback investigation of patients operated on by the infected surgeon during the preceding 10 years was conducted under the auspices of the Israel Ministry of Health to determine whether any surgeon-to-patient HIV transmission had occurred. Of 1,669 patients identified, 545 (33%) underwent serologic testing for HIV antibody. All results were negative. A Ministry-appointed panel of experts delineated conditions under which the surgeon could resume work. The results of this investigation add to previously published data indicating a low risk for provider-to-patient HIV transmission.

The surgeon had been in practice for more than 2 decades and performed approximately 150 procedures per year. The surgeon reported no risk factors for HIV and had no available record of prior HIV testing. The surgeon was aware of and reportedly compliant with institutional infection-control guidelines and did not report any incidents of blood exposures that might have placed patients at risk.

At the time of diagnosis, the surgeon's CD4 T-cell count was 49 cells/$\mu$L, and HIV RNA was >100,000 copies/mL. The surgeon had a protective serum level of hepatitis B surface antibody and was seronegative for hepatitis C virus (HCV) antibody.

The Ministry of Health was notified of the diagnosis and, to allay fears of potential exposure,

in January 2007 instructed the hospitals at which the surgeon worked to contact all patients operated on by the surgeon since 1997 and to offer them HIV testing. Computerized lists of the surgeon's patients generated by the hospitals based on operation reports were cross-checked with the national registry of HIV-positive patients. Because all laboratories performing non-anonymous HIV testing in Israel are obligated to send positive serum samples to the Ministry of Health's national HIV reference laboratory for confirmation, this registry contains the names of all patients who have tested positive for HIV infection in the country, with the exception of those found positive in anonymous testing. Patients were contacted by regular mail or telephone, advised that an unnamed surgeon who operated on them was found to be HIV positive, and told that although the risk for HIV transmission via surgery was minimal, they were being offered free testing and counseling. A telephone hotline for patients with questions was established at the surgeon's hospital of current employment, and this number was provided via the national news media and in the letters mailed by this hospital.

The protocol for testing, as delineated by the Ministry of Health, was as follows: 1) initial screening for HIV antibody was to be performed via enzyme-linked immunosorbent assay (ELISA) of serum; 2) if the result was equivocal, combination testing, via ELISA, for HIV antibody and p24 antigen simultaneously, was to be performed twice; 3) if the result of combination testing was equivocal, an additional serum sample was to be requested for testing 1 month later; and 4) in the event of a positive result on HIV antibody or combination testing, serum was to be submitted to the national reference laboratory for Western blot confirmation.

A total of 1,669 patients, operated on by the surgeon at four hospitals, were identified. None was listed in the national HIV registry, indicating that none had ever tested positive (non-anonymously) for HIV infection in Israel. A total of 121 were known to have died, and a correct address could not be obtained for 54. An attempt was made to contact the remaining 1,494 patients. A total of 545 patients (33% of the total 1,669) submitted serum samples. A total of 531 samples (97%) were tested at either of two virology laboratories at tertiary-care hospitals; the remaining 14 samples were tested at outside laboratories, and results were submitted to the investigators. All samples were reported negative for HIV antibody (1-sided, 97.5% confidence interval = 0--6.7 per 1,000 patients, via Poisson distribution).

After receipt of these results, the Ministry of Health appointed a panel of experts to determine whether and under what conditions the surgeon could resume work. Upon diagnosis, a regimen of antiretroviral therapy had been prescribed for the surgeon, and at the time of the panel's report, the surgeon's CD4 T-cell count was 272 cells/$\mu$L and HIV RNA was below the threshold of detection (<50 copies/mL). Antiretroviral-resistance testing performed at baseline revealed no resistance-associated mutations. After considering the clinical details of the surgeon's case, the published literature on HIV transmission from infected health-care workers to patients, and the findings of this lookback investigation, the panel recommended allowing the resumption of work, with no restrictions on the types of procedures the surgeon could perform, provided the surgeon met the following conditions: 1) instruction by infection-control personnel at the surgeon's hospital regarding safe practices, including adherence to standard precautions and hand hygiene requirements (*3*), double-gloving during all surgery,

and immediate reporting of any cuts in gloves or fingersticks, plus agreement by the surgeon to abide by these practices; 2) routine health-care follow-up at 3-month intervals, including measurement of CD4 T-cell count and HIV RNA; and 3) adherence to a prescribed antiretroviral regimen, maintenance of good health, and continued CD4 T-cell level >200 cells/$\mu$L, with HIV RNA below the threshold of detection. On the basis of the published literature, the panel did not require notification of prospective patients of the surgeon's HIV status because of the extremely low likelihood of transmission to patients if the conditions for resuming surgery were met.

These conditions were consistent with the recommendations contained in the position paper of the Society for Healthcare Epidemiology of America of 1997 (*4*). By agreement with the surgeon and the administration at the hospital of current employment, an infection-control physician on the hospital's staff familiar with the case was charged with ensuring compliance with these conditions. As of June 2008, none of the 1,669 patients included in the initial contact list was listed in the national HIV registry.

**Reported by:** *MJ Schwaber, MD, on behalf of the HIV Lookback Working Group, Israel Ministry of Health. I Sereti, MD, National Institute of Allergy and Infectious Disease, National Institutes of Health, US Dept of Health and Human Svcs.*

## Editorial Note:

Transmission of HIV from a health-care worker to patients is extremely rare. In the early 1990s, CDC reported on six patients infected by a Florida dentist (*5*). Subsequently, only three additional cases have been reported: 1) probable transmission from an orthopedic surgeon to a patient in France; 2) probable transmission from a nurse to a patient, also in France; and 3) probable transmission from a gynecologist to a patient during a cesarean delivery in Spain (*6*). This report contributes to the published literature suggesting that, when proper procedures are followed, the risk for surgeon-to-patient transmission of HIV is minimal.

In 1991, CDC issued guidelines to prevent transmission of HIV and hepatitis B virus (HBV) to patients, which required health-care workers infected with either of these viruses to refrain from performing exposure-prone procedures before obtaining counsel from a review panel and to notify prospective patients of the health-care worker's seropositivity before performing exposure-prone invasive procedures (*7*). The guidelines provide general characteristics of exposure-prone procedures, which include digital palpation of a needle tip in a body cavity or the simultaneous presence of the health-care worker's fingers and a needle or other sharp instrument or object in a poorly visualized or highly confined anatomic site. Although medical organizations and institutions are advised to identify specific procedures falling into this category, the guidelines include cardiothoracic procedures among the types of invasive surgical procedures that should be considered exposure-prone. Regarding retrospective notification of patients who have had exposure-prone procedures performed on them by infected health-care workers, the guidelines note that more data are needed to determine the risk for transmission during such procedures, and notification should be considered on a case-by-case basis, taking into consideration an assessment of specific risks, confidentiality issues,

and available resources (*7*).

During the 17 years since the CDC guidelines were issued, data based on published lookback investigations of bloodborne pathogen outbreaks and mathematical modeling indicate that the risk for transmission of HIV from an infected surgeon to a patient is considerably lower than that for HBV or HCV (*6,8*). Regarding cardiothoracic surgery specifically, previous lookback studies have revealed transmission of HBV and HCV (*6,8*) but no transmission of HIV (*9*). Moreover, the degree of blood infectivity of HIV carriers has been shown to vary, in part, as a function of viral load (*10*), which can now be rendered undetectable via use of antiretroviral regimens that were unavailable at the time the guidelines were issued.

The findings in this report are subject to at least two limitations. First, HIV test results were available for only one third of the patients identified as having been operated on by the infected surgeon. Some of the patients had died, and the cause of death was not known to the investigators. Some were not successfully contacted, some might have been tested anonymously, and some might have been tested in laboratories other than those provided by the investigation centers and not have notified the investigators of their results. However, more than 1 year after the investigation was initiated, none of the names on the initial contact list appeared in the national registry of known HIV-positive patients, which contains the names of all patients having tested positive for HIV (non-anonymously) in Israel. Second, only patients operated on by the surgeon during the decade before diagnosis were sought. Although transmission of HIV might have occurred more than 10 years before diagnosis, this possibility is unlikely given the fact that, untreated, the surgeon was clinically well until the weeks preceding diagnosis.

This report adds to the existing body of data already accumulated from lookback studies of patients of HIV-positive health-care workers and adds to the data contained in the single previously published lookback investigation of potential HIV transmission from a cardiothoracic surgeon to patients (*9*). The data in this and other studies published since the CDC guidelines of 1991, considered together, argue for a very low risk for provider-to-patient HIV transmission in the present era and could form the basis for national and international public health bodies to consider issuing revised guidelines for medical institutions faced with HIV infection in a health-care worker performing exposure-prone procedures.

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