Editorial

Occupational Exposure to Hepatitis C Virus: A Dilemma

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Hepatitis C virus (HCV) is transmitted most efficiently by large or repeated percutaneous exposures to blood, such as through the transfusion of blood or blood products from infectious donors or the sharing of contaminated needles among injection drug users. Other bloodborne viruses, such as the hepatitis B virus, are transmitted not only by overt percutaneous exposures, but by mucous membrane and inapparent parenteral exposures as well. Although these types of exposures are prevalent among healthcare workers, the risk factors for HCV transmission in this occupational setting are not well defined. A case-control study of patients with acute non-A, non-B hepatitis conducted prior to the discovery of HCV found a significant association between acquiring disease and healthcare employment, specifically patient care or laboratory work.[1] Seroprevalence studies have reported antibody to HCV (anti-HCV) rates of 1% among hospital-based healthcare workers in Western countries and 4% among such workers in Japan.[2] In the one study that assessed risk factors for infection, a history of accidental needlesticks was associated independently with anti-HCV positivity.[3]

Case reports have documented the transmission of HCV infection from anti-HCV-positive patients to healthcare workers as a result of accidental needlesticks or cuts with sharp instruments.[2] In the study reported by Lanphear et al in this issue[4] on the follow-up of healthcare workers who sustained a variety of different types of exposures to blood from anti-HCV-positive patients, 3 (6%) of 50 with needlestick exposures seroconverted to anti-HCV on the basis of second-generation enzyme immunoassays (EIA) and supplemental testing. A fourth healthcare worker who sustained a scalpel laceration from an anti-HCV-positive source contracted clinical non-A, non-B hepatitis without anti-HCV seroconversion. Among patients with HCV infection, the second-generation EIAs detect anti-HCV in approximately 90%[2]; thus, in about 10% of persons with HCV infection, the diagnosis can be made only with research-based detection methods, such as polymerase chain reaction (PCR) testing for HCV RNA. If we assume that the fourth healthcare worker also contracted hepatitis C, then the risk of HCV infection after a total of 57 exposures to needlesticks or sharps was 7%; 2 of the 4 infected healthcare workers developed clinical hepatitis.

These results are consistent with a similar study reported from Japan.[5] In this study, five of 76 healthcare workers with needlestick exposures to anti-HCV-positive patients seroconverted to anti-HCV for an incidence of 7%; however, an additional two infections were detected by PCR for an overall incidence of 9%. When exposures only to HCV RNA-positive source patients were included (68 of 76), the overall incidence of HCV infection was 10%. Liver enzyme elevations developed in 4 of the 7 infected healthcare workers. Although no infections were detected among the small number of healthcare workers who sustained mucous membrane or open skin lesion exposures in the study by Ianphear et al, a recent case report has documented the transmission of HCV from a blood splash to the conjunctiva.[6]

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Thus, it seems clear that HCV infection is an occupational risk for healthcare workers exposed to infectious blood. Unfortunately, postexposure prophylaxis with immune globulin does not appear to be effective in preventing hepatitis C. Historically, several studies have attempted to assess the value of prophylaxis with immune globulin for the prevention of posttransfusion non-A, non-B hepatitis, but the results are difficult to compare and interpret because of lack of uniformity in diagnostic criteria, mixed sources of donors (volunteer and commercial), and different study designs (some lack blinding and placebo controls).[2] In some of these studies, immune globulins seemed to reduce the rate of clinical disease, but not overall infection rates; in one study, patients receiving immune globulin were less likely to develop chronic hepatitis. None of these data have been reanalyzed since anti-HCV testing became available, and in only one study was the first dose of immune globulin given after, rather than before, the exposure, making it difficult to assess its value for postexposure prophylaxis.

Virtually all persons with acute HCV infection become chronically infected, and chronic liver disease with persistently elevated liver enzymes develops in an average of 67%.[2] These extraordinarily high rates of chronic disease and persistent viremia in humans, and the animal transmission experiments that have demonstrated that chimpanzees convalescent from HCV infection are not protected against rechallenge with homologous or heterologous HCV strains, suggest the absence of an effective neutralizing immune response.[7] Furthermore, immune globulin now is manufactured from plasma that has been screened for anti-HCV A recent experimental study in chimpanzees found that immune globulin manufactured from screened plasma administered 1 hour after exposure to HCV did not prevent infection or disease.[8] In February 1994, the Immunization Practices Advisory Committee reviewed the available data and concluded there was no support for the use of immune globulin for postexposure prophylaxis of hepatitis C (Centers for Disease Control and Prevention, unpublished data).

In the absence of postexposure prophylaxis, should there be a defined protocol for the follow-up of healthcare workers who experience an exposure to an anti-HCV-positive source? In deciding the answer to this question, several issues must be considered, including the limited data on the risk of transmission, the limitations of available serologic testing for detecting infection and determining infectivity, the undefined risk of transmission by sexual, household, and perinatal exposures, and the limited benefit of therapy for chronic disease.

Although it seems clear that needlestick exposure to infectious blood is a risk factor for hepatitis C, the data are limited or nonexistent on the risk of transmission associated with other types of occupational exposures, making it difficult to provide healthcare workers who sustain such exposures with a meaningful estimate of their chances of developing HCV infection. Testing methods readily available in the clinical setting also have limitations. With the commercially manufactured EIAs that detect anti-HCV, there may be a prolonged interval between exposure and seroconversion. In many populations, including healthcare workers, the rate of false positivity for anti-HCV is high, and supplemental assays always should be used to judge the validity of repeatedly reactive EIA results. About 10% of infections will not be detected unless PCR is used to detect HCV RNA. Although PCR assays for HCV RNA are available from several commercial laboratories on a research-use basis, they are not standardized and the cost is high, about $200 per test. Both false-positive and false-negative results can occur from improper handling and storage or contamination of the test samples. In addition, the detection of HCV RNA may be intermittent, and the meaning of a single negative PCR test result is inconclusive.

All anti-HCV-positive persons should be considered potentially infectious; however, neither the presence of antibody nor the presence of HCV RNA is a direct measure of infectivity in settings where inapparent parenteral or mucosal exposures occur. Epidemiologic studies have implicated exposure to infected sexual and household contacts as well as exposure to multiple sexual partners in the transmission of HCV.[2] Serologic studies of the sexual and household contacts of patients with chronic hepatitis C have found evidence of HCV infection in 0% to 30% of sexual partners or spouses and 0% to 20% of children. Studies of infants born to anti-HCV-positive mothers have reported rates of perinatal transmission ranging from 0% to 13%; in two small studies, only mothers with "high" titers of HCV RNA transmitted HCV to their infants.[9,10] The inconsistent results of these studies, as well as studies that looked for HCV RNA in body fluids other than serum and plasma, may reflect different concentrations of virus in the infected persons sampled. The risk that an HCV-infected individual will transmit the virus may be related to the type and size of the inoculum and the route of transmission, as well as the titer of virus, but there are insufficient data on the threshold concentration of virus needed to transmit infection. In the absence of such data and standardized tests to measure infectivity, it is difficult to counsel anti-HCV-positive persons about their risk of transmission to others.[11]

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The most obvious benefit from a follow-up protocol would appear to be the opportunity for the healthcare worker to seek evaluation for chronic liver disease and treatment, if eligible. Studies have shown that alpha-interferon therapy may have a beneficial effect among some patients.[12] In these studies, however, the patients were highly selected and therapy resulted in sustained improvement in 20% or fewer of those treated; no clinical, demographic, serum biochemical, serological, or histological features have been identified that reliably predict which patients will respond to treatment and sustain a long-term remission.

In the face of all of these limitations and unknowns, it is difficult to formulate a rational policy for postexposure follow-up for HCV infection. Balanced against these difficulties are the individual workers' concerns about their risk and outcome. A definitive answer to this dilemma may have to await advances in our ability to diagnose, determine infectivity, estimate risks, and provide effective therapy for persons exposed to or infected with HCV. In the absence of either pre- or postexposure prophylaxis against this infection, prevention will continue to depend on measures such as universal precautions and other educational tools that limit the opportunity for exposures to occur in the occupational setting.

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CDC Releases Draft Guideline for Isolation Precautions in Hospitals

by Gina Pugliese, RN, MS
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The CDC has released the Draft Guideline for Isolation Precautions in Hospitals that will replace the 1983 edition, The draft guideline was published in the November 7, 1994, issue of the *Federal Register* [vol. 59(214):55552-70]. The draft guideline was prepared by the USPHS Hospital Infection Control Practices Advisory Committee (HICPAC) and the CDC. The revised guideline contains to tiers of precautions. The first tier is standard precautions designed for the care of all patients; it combines the major features of universal precautions and body substance isolation. The second tier is precautions for patients known or suspected to be infected or colonized with epidemiologically important organisms, including airborne, droplet, and contact precautions. The CDC has suggested that healthcare facilities may wish to consider waiting until the final guidelines are completed in the fall of 1995 before changing current procedures.

Comments on this draft should be submitted in writing by January 6, 1995, to CDC, Attention: Isolation Guideline Information Center, Mailstop A-07,1600 Clifton Rd. NE, Atlanta, GA 30333.

The guideline can be viewed and photocopied from *the Federal Register* at any U.S. Government Repository Library or any library that receives the *Federal Register.* For the government library nearest you, call (202) 512-1800.

Copies of the draft guideline also are available from the American Hospital Association, by calling (800) 242-2626 (catalog no. 0094600; price $7.95; includes shipping and handling).

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