Implications of the Occupational Safety and Health Administration's Bloodborne Pathogen Standard for the Occupational Health Professional

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On December 6, 1991, The Occupational Health and Safety Administration (OSHA) issued its final regulation concerning occupational exposure to bloodborne pathogens (29 CFR 1910.1030). OSHA has determined that workers in a variety of settings face a significant health risk as the result of occupational exposure to blood and other body fluids. The pathogens that are of the most concern include human immunodeficiency type 1 (HIV) and hepatitis B virus (HBV). OSHA concludes that the hazard can be minimized via engineering and work practice controls, personal protective equipment, HBV vaccination, training and education, and appropriate use of signs and labels. Occupational health professionals, including physicians, nurses, industrial hygienists, and safety officers, are faced with the challenge of writing and periodically updating exposure control plans that are unique to their settings, as well as advising colleagues in other settings. They are charged with identifying the appropriate at-risk groups within their workplace, and providing them with the appropriate training to enable employees to understand the rationale for the safety procedures that prevent exposures to bloodborne pathogens. This review of HIV/HBV articles pertinent to the occupational setting analyzes six topics including: (1) occupational risk of transmission of HIV, (2) occupational risk of transmission of HBV, (3) special concerns of dental practices, (4) risk of HIV/HBV outside the hospital, medical, or dental office setting, (5) legal and ethical issues involved in HIV testing, and (6) the United States Public Health Service postexposure HIV/HBV prophylaxis/treatment recommendations.

On December 6, 1991, the Occupational Safety and Health Administration (OSHA) issued its final regulation concerning occupational exposure to bloodborne pathogens (29 CFR 1910.1030). OSHA has determined that workers in a variety of settings face a significant health risk as the result of occupational exposure to blood. Other body fluids that when contaminated with blood have been shown to transmit human immunodeficiency virus type 1 (HIV) and hepatitis B virus (HBV) include semen, breast milk, and vaginal secretions. The pathogens that are of the most concern include HIV and HBV. OSHA concludes that the hazard can be minimized via engineering and work practice controls, personal protective equipment, HBV vaccination, training and education, and appropriate use of signs and labels.[1]

The bloodborne pathogen standard went into effect on March 6, 1992. Initial education and training of exposed workers was required by June 4, 1992. As of July 6, 1992, engineering and work practice controls, personal protective equipment, housekeeping (including proper disposal of waste materials), hepatitis B immunizations and postexposure follow-up plans, and labels and signs were required. This standard actually expands on the Hazard Communication Standard of 1991, which covers physicians' and dentists' offices.[2]

In addition to hospitals, the most common places of exposure include physicians' and dentists' practices; research and clinical laboratories; nursing homes; outpatient facilities; com-

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pany medical departments; blood or plasma donation facilities; residential facilities for the handicapped; personnel services; funeral services; police, fire, and rescue units; correctional facilities; and medical repair services. The other potential pathogens that may be transmitted include HIV-2, hepatitis C, delta virus, syphilis, malaria, babesiosis, brucellosis, leptospirosis, arbovirus, Creutzfeldt-Jakob disease, toxoplasmosis, and cytomegalovirus.[3,4]

Occupational health professionals including physicians, nurses, industrial hygienists, and safety officers are faced with the challenge of writing and periodically updating exposure control plans that are unique to their settings, as well as advising colleagues in other settings. Such plans may pertain to medical or dental departments, but may also pertain to other areas, such as housekeeping and laboratory personnel, with potential exposure to bloodborne pathogens. Occupational health professionals are charged with identifying the appropriate at-risk groups with potential exposure and providing appropriate educational material on a continuing basis. They must identify the particular jobs in which exposure is likely to occur, and ensure that employees understand the rationale and are properly using universal precautions including handwashing, protective barriers, and care in the use and disposal of needles and other sharp instruments. Occupational health nurses have a key role in supervising staff in maintaining proper health and safety and in ensuring compliance with the regulation.[5,6]

Because the standard has already been enacted, and the initial exposure control plans have theoretically been put into place, the major role of the occupational physician will be to educate people who are actually or potentially exposed to blood and other fluids which may be potentially contaminated with blood. These fluids include semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, saliva in dental procedures, any other body fluid visibly contaminated with blood, unfixed tissues or organs from a human, and HIV- or HBV-containing cell tissue or organ cultures.

This review addresses recent issues described in the medical literature as well as OSHA directives that will aid the occupational health professional in maintaining a current exposure control plan. Six topics are addressed in this review: (1) risk of transmission of HIV, (2) risk of transmission of HBV, (3) special concerns of dental practices, (4) risk of HIV/HBV outside of the medical or dental office or hospital setting, (5) legal and ethical issues involved in HIV testing, and (6) United States Public Health Service recommendations for postexposure prophylaxis or treatment.

1. Risk of Transmission of HIV

This section discusses both the risk of health care workers being infected with HIV and transmitting HIV. The World Health Organization estimates that at least 15 million people worldwide are infected with HIV, and it is estimated that 50 million people will be infected by the year 2000. Ninety percent of these people will be in Africa. The percentage of HIV cases among intravenous drug users and heterosexuals is increasing, whereas the percentage is decreasing among homosexual males. Women and children are at increasing risk for contracting AIDS because of heterosexual and transplacental transmission. It is estimated that approximately one million Americans are HIV-positive and that more Americans will die as a result of HIV than were killed in the Korean and Vietnam wars combined. HIV is now the leading cause of death in American women between the ages of 25 and 40.[7-9]

HIV-2, a different strain of the HIV virus, has also been reported to cause AIDS. As of May 1992, 17 cases have been reported in the United States, one in a potential blood donor. Epidemiologic studies indicate that this virus is prevalent in Western Africa and is thought to be less transmissible than HIV-1. However, because this virus is transmitted in blood, sporadic cases of HIV-2 can be expected outside of Western Africa, thus making this virus a potential source of concern to health care workers.[10,11]

As of September 30, 1993, the Centers for Disease Control (CDC) is now aware of 39 health care workers who have been documented as having seroconverted to HIV following occupational exposures, including 11 who have AIDS. Those who have seroconverted include 16 laboratory workers (15 of whom were clinical laboratory workers), 13 nurses, 5 physicians, and 5 persons in other health care work. The exposures were percutaneous (puncture or cut) (34 of 39 cases) mucocutaneous (mucous membrane and/or skin) exposures (4 of 32 cases), and combined percutaneous and cutaneous exposure (1 of 32 cases). The CDC describes possible occupational transmission or AIDS/HIV infection in 71 other health care workers that has not been confirmed by viral sequencing techniques.[12,13]

The CDC undertook an ongoing prospective study of health care workers in 312 health care facilities from August 1983 to June 1992. The results of this surveillance indicate that all of the documented seroconversions in health care workers in this group have been as a result of a percutaneous injury with a sharp object and obvious contact with blood. The factors known to increase the potential for infection include a stick with a hollow-bore needle (no known cases of seroconversion have been reported after contact with a suture needle), a deep stick, and a high titer of virus in the source. However, case reports to CDC indicate at least five workers who were not part of the multicenter study where seroconversion occurred after skin or mucous membrane contact with large amount of blood. The risk of seroconversion after skin or mucous membrane contact with blood, while rare, is further confirmed in an Italian multicenter study.[14-16]

Several multicenter studies indicate that the risk for seroconversion after a needle stick or sharp injury with a known specimen of HIV positive blood is 0.3–0.4%. The risk for seroconversion after mucous membrane or skin contact is much lower and is estimated at 0.09%. This is a low risk for any single encounter, but may represent a huge cumulative risk for the profession, particularly certain high-

risk subgroups such as surgeons, trauma team, etc.[7,14,19]

Lowenfels et al[20,21] surveyed surgeons in the New York metropolitan area and found that 86% of the surgeons reported at least one puncture injury in the preceding year; 76% of the injuries occurred during surgery, and the mean injury rate was 4.2 per 1000 operating hours. Fifty-three percent of the injuries involved the index finger of the nondominant hand. Based upon an HIV rate of 5% in surgical patients, this group estimated a 1–2% lifetime risk of HIV infection for surgeons, based upon a 30-year career. This estimate would actually be higher in hospitals or in any other setting where prevalence of HIV infection is higher than 5%. Wears[22] and Pauker[23] cite similar cumulative risk rates in emergency department physicians with lifetime estimates of occupationally acquired HIV of 1–2%.

The CDC has developed a model that estimates the likelihood that a health care worker would transmit HIV to a patient. This is a worse-case model based upon surgeons who perform invasive procedures (although it is certainly possible that other health care workers could transmit HIV or HBV). This model states that the probability of transmission of HIV during a surgical procedure performed by an HIV-infected surgeon is somewhere between 1 in 42,000 and 1 in 420,000 procedures, depending upon the likelihood that a surgeon would sustain an injury during a procedure, the likelihood that the sharp object causing the injury would come into contact with the patient's blood, and the likelihood that the infection will be transmitted to the patient after such an exposure. These numbers are consistent with those cited by Rhames.[17,24,25]

Based upon the studies cited in this review, it would appear that there is a higher risk of transmission of HIV from patient to health care worker than exists for transmitting HIV from the health care worker to the patient. As of March 1992, the CDC was aware of 13,000 patients tested for HIV after treatment by 27 HIV-positive health care workers. At this time, 75 patients have tested positive. At least 10 cases of HIV have been documented to come from sources other than the health care worker. The source of HIV infection in the other 65 subjects is unknown, but presumably some of the 65 subjects had other potential sources besides the affected health care worker. The only cases of HIV transmission from health care worker to patient that have been confirmed by HIV viral sequencing are the five documented seroconversions after treatment by the HIV-infected dentist in Florida.[26–29]

To better quantify the risk of patients acquiring HIV infections during invasive procedures, three subsequent studies were undertaken concerning the practices of an HIV-infected breast surgeon,[30] an orthopedic surgeon,[31] and a dentist.[32] In these three studies, 2,555 patients agreed to follow-up HIV testing and no instances of transmission occurred.[33]

Furthermore, testing each patient of an HIV infected health care worker is expensive (averaging $130,000 to test all the patients of an infected practitioner), and potentially unreliable because each patient must be tested many times over 6 months.[34–36]

2. Risk of Transmission of HBV

HBV is an important part of the Bloodborne Pathogen Standard because it continues to be a highly prevalent serious and preventable illness. In addition, there have been many reports of transmission of HBV both from and to health care workers. Therefore, there are more studies that indicate which actions or procedures are likely to transmit this agent.

Before the widespread use of HBV vaccination, an estimated 300,000 persons in the United States were infected with HBV. One-fourth became ill with jaundice; more than 10,000 required hospitalization. An estimated 12,000 of these HBV-infected people were health care workers. Approximately 4,000 HBV-infected people still die annually of HBV-related cirrhosis, and 800 people die annually of hepatocellular carcinoma. Serologic studies indicate that as many as 4.8% of the healthy American population tests positive for HBV.[6,17,18,29,37]

HBV is known to be transmitted more easily than HIV. As stated previously, the risk of transmission of HIV is 0.3%; the risk of transmission of HBV is estimated at 100 times greater or 30% per encounter with known contaminated blood. Twenty-nine dentists and surgeons have been reported to have transmitted 330 cases of HBV to patients. Retrospective studies of these people showed either a major deviation from accepted infection control practices (for example, not wearing gloves during an invasive procedure) or a history of unintentional injury to the health care worker while doing an invasive procedure.[19,38]

Several studies cite particular surgical procedures that have a higher incidence of HBV transmission. Some of the procedures associated with increased risk include trauma surgery, gynecologic procedures including vaginal hysterectomies and caesarean sections, orthopedic surgery, and protracted procedures and/or those associated with blood loss of greater than 250 to 300 mL. One other case report described transmission via dermatitis on an ungloved technician's hand.[39–45]

There are other potential sources for nosocomial transmission of HBV. Polish et al[46] describe a cohort of 26 patients in a single hospital ward who apparently contracted HBV after undergoing capillary blood sampling with the same spring-loaded lancet device. Review of the nursing procedures indicated that the platform of this device was not routinely changed after each use, thus allowing for the transmission of HBV. Other reported nosocomial sources of HBV include contaminated syringes used for jet injections in a weight reduction clinic, patients undergoing endoscopy, use of acupuncture, and contamination of multidose medication vials.[44,46]

The technology exists to prevent HBV. Two vaccines are now approved and include Recombivax (Merck) and Engerix-B (SmithKline-Beecham). These vaccines have not been reported to have any major side effects, and are now recommended by the American Academy of Pediatrics as part of the routine childhood series.

These vaccinations are also a requirement for entrance to most medical schools and residency programs. Hospital workers are offered this vaccination upon employment. In view of the relatively minor side effects and potential benefits, there is a great need for aggressive vaccination programs for health care workers, and indeed universal vaccination. Dosages and postexposure prophylaxis will be discussed in the last section.[37,47,48]

3. Special Concerns of the Dental Profession

Ciesielski[29] performed a retrospective epidemiologic follow-up of the dentist who was documented by DNA sequencing to have transmitted HIV to five patients. A detailed analysis of this practice indicated that all of the infected patients had invasive procedures performed by the dentist, and four were seen on a single day, but no specific breach in infection control or other dental practice was known to have occurred resulting in the HIV transmission. However, it was noted that no written protocol or consistent clean-up and instrument reprocessing policies were present. Anesthetic needles were commonly recapped by the dentist. The amounts of local anesthetic used by the dentist were not documented, nor was it documented the frequency that needles were reused. Other studies have failed to show evidence of HIV transmission from HIV infected dentists to patients.[32,33]

Further information about the risks of transfer of infectious agents can be found in the study of transmission of HBV in dental practices. Shaw[49] reviewed nine cases of HBV in a dental practice in Indiana. In this case the dentist was unaware of his own infection, and the cases were believed to be related to the degree of invasiveness of the procedure. These findings are consistent with those of other researchers, and it was clearly established several years ago that the wearing of gloves during dental procedures serves to decrease the transmission of bloodborne pathogens.[49-53]

Klein[54] note that only one dentist without a history of behavioral risk factors was thought to have acquired HIV from treating a patient. Capilouto[38] studied the dentist's occupational risk of becoming infected with HBV or HIV. This study indicates that the annual cumulative risk of infection from routine treatment of patients whose seropositivity is unknown is 57 times greater from HBV than from HIV, and that the risk of dying from HBV infection is 1.7 times greater than the risk of HIV infection, for which mortality is almost certain.

Because of the low rates of transmission of bloodborne pathogens both from dental professionals to patients and from patients to dentists, the American Dental Association is protesting many aspects of the Bloodborne Pathogen Standard. They state that this standard is considered arbitrary and capricious. The standard states that recapping of needles is a practice that should be avoided. The dentists feel that recapping of needles, particularly during administration of local anesthetics, is a widespread and necessary practice, and one that the dentists believe is a safe practice and should be allowed under the OSHA Standard. Aerosols from a dental patient's mouth occur unpredictably, and may not fit into all of the protocols listed in the standard. The dentists cite the need for more scientific means of improving techniques and use of protective equipment to best avoid exposure.[55]

4. Concerns of Groups Not Classically Considered Health Care Workers

Most articles in the literature that are concerned with bloodborne pathogens focus on physicians' offices, dental offices, hospitals, nursing homes, and emergency services/ambulances. This section reviews the concerns of other potentially exposed workers who may need to be considered in preparation of emergency control plans.

Beck-Sague[56] reviews the risk of infection in mortuary practitioners. Most of these people work in commercial funeral homes, but others may work for hospitals, research institutions, or government agencies. The practice of embalming is considered to have a high potential risk for exposure because sharp instruments are used to draw blood from the cadaver and replace this blood with embalming fluid. Thirty-nine percent of mortuary practitioners report at least one needle stick during the 12-month period of this study. Skin contact with blood was noted by 73% of the practitioners, and 17% described splashes to the mouth or eyes.

Most mortuary workers state that they are aware of the risks of exposure to HIV and HBV, and many state that they would either decline to handle funerals of those diagnosed with HIV or charge more money for those funerals. This group was also surveyed concerning the use of personal protection. In suspected HIV cases, morticians report the use of gloves 95% of the time, goggles 92% of the time, masks 84% of the time, and gowns 95% of the time. Only 34% report HBV immunization. Although no reported cases of occupationally transmitted HIV have yet been reported in this group, these workers should be encouraged to practice universal precautions and obtain HBV immunization.

Other workers with potential occupational exposure would include public safety (police, firefighters, law enforcement agents, US Customs agents responsible for conducting searches for illegal drugs), correctional officers, hairdressers, barbers, cosmetologists, manicurists, tattoo artists, and massage therapists. Research workers in the pharmaceutical industry would also be considered potentially exposed to bloodborne pathogens. A study by the New Jersey Department of Health indicated that needle-stick injuries among staff at correctional institutions have been reported, but no cases of occupationally transmitted HIV have been reported at this time. Similarly, firefighters, when performing their usual duties, have not been reported to have an increased risk of HBV infection compared with the general population.[57-61]

The reports discussed above suggest that it is unlikely for HIV to be transmitted in the occupational setting to workers who are not functioning as

health care workers. HIV can only maintain infectivity for a few hours outside of the body when it is in high concentration, as in a hospitalized or acutely ill patient. In patients likely to be seen outside of this setting, the HIV titers would be relatively low and less likely to be transmitted. However, HBV maintains infectivity for a much longer time, possibly days, and is more likely to be transmitted in settings outside a medical facility.

An anecdotal report has been made about butchers. They have been shown to transmit HBV through the use of shared cutting instruments. In this case, an employee with asymptomatic HBV transmitted the virus to coworkers through small hand cuts that commonly occur in meat cutters. The virus may have been transmitted through direct contact with other employees hands, with similar cuts, or through bleeding on the cutting knives. The relatively easy transmission of HBV in these settings further supports the concept of universal HBV fascination.[62,63]

5. Legal and Ethical Issues

There are many legal, ethical, and moral issues that are faced by all health care workers as the prevalence of HIV and HBV increases in society in general, and the risk of infection to health care workers increases. Occupational health professionals, in particular, must maintain appropriate exposure control plans and procedures and advise their colleagues concerning these issues.

Many excellent references discuss the rationale for HIV testing in health care workers. Angell[64] states that "patients have a right to know whether a doctor or nurse who performs invasive procedures is infected with HIV," because it is "remotely possible" that blood-to-blood contact could occur. The CDC has estimated that the risk of HIV transmission from an infected health care worker to a patient is 2.4 to 24 per 1,100,000 procedures. This is significantly less than the risk for health care workers acquiring HIV from a patient in 1 to 250 to 300 procedures.

This subject was discussed by an expert panel at the American College of Physicians' meeting in April 1992. The panel concluded that physicians do not have a legal obligation to tell patients of their status, but probably have a moral obligation to disclose their status. The panel suggested that most surgeons surveyed would probably not tell their patients if they were HIV-positive if they were physically able to perform the procedure due to the small perceived risk to the patient versus the impact upon the surgeon's ability to practice.[65-67]

Does the hospital have the right to deny privileges to a surgeon or to tell the patients of the surgeon's HIV status? A New Jersey court recently upheld a hospital's denial of privileges to an HIV-infected otolaryngologist. In a similar case, a Missouri court upheld the right of a dental school to deny admission to a senior dental student who was known to be HIV-positive.[68-70]

Most professional organizations support the concept of HIV-infected professionals voluntarily abstaining from risky practices. The American Medical Association states that "HIV-infected physicians should either abstain from performing invasive procedures which pose an identifiable risk of transmission or disclose their seropositive status prior to performing a procedure and proceed only if there is informed consent." The American Dental Association states that "HIV-infected dentists should refrain from performing invasive procedures or disclose their serological status." The CDC states that medical, surgical, and dental institutions should identify exposure-prone procedures. They state that health care workers who perform these procedures should know their HIV status. They should not perform exposure-prone procedures without seeking appropriate counselling. Presently, most health professionals support voluntary testing of exposed persons without mandatory requirements.[7,65,67,68]

Gerbert[71] recently conducted a nationwide random telephone study of 1350 adults. This study indicates that more of the public believes that transmission can occur from HIV-infected health care workers to patients. Seventy-eight percent favored mandatory testing of all dentists, 79% for all physicians, and 85% for all surgeons. However, fewer people would switch physicians, and only 5% of the public believes that physicians should be denied the right to practice medicine.

The problems with mandatory testing include the cost, the appropriate frequency of testing, and the implications of both false-positive and false-negative results. At least two studies state that it may take as many as 6 months after an exposure for HIV seroconversion to occur. Therefore, testing of large numbers of health professionals would still miss many potential carriers of this disease unless testing were to be required at least every 6 months. A negative test result in this setting may provide a false sense of security and may decrease the precautions taken against HBV. A false-positive test, when taken in a group of healthy people with no known risk factors, may occur as frequently as 1 in 1250.[17,71,72]

Should all potential patients be tested? Many question the cost and/or legality of this form of testing, particularly upon admission to a hospital and without any sort of informed consent. Informed consent may not be required if such a test is only being performed for "research purposes." Several hospitals have undertaken testing of all patients upon admission within a research mode, but there were no uniform procedures in each hospital, and most of these results are difficult to interpret. Similar discrepancies were noted in the testing of asymptomatic prisoners.[73-77]

It is clear that there are many controversies surrounding HIV testing in patients and health care workers. Therefore, it is apparent that (1) education is crucial in preventing the spread of HIV in the work setting and otherwise, (2) methods need to be developed to reduce the incidence of sharp instrument injuries in health care workers, (3) voluntary testing of people in high-risk groups should be encouraged; and (4) mandatory testing of both health care workers and potential patients remains a major controversy. The test may be performed before seroconversion, thus

creating a false sense of security. The cost of mass testing may become prohibitive, further straining the health care system.

Currently, HIV testing can only be considered in the mode of secondary prevention at best. It is strongly recommended that traditional occupational medicine primary approaches designed to decrease exposure to bloodborne pathogens including work practice and engineering controls, as well as aggressive HBV immunization programs, be strongly encouraged.

6. Postexposure Procedures

Exposure control plans must include a system for promptly initiating evaluation, counselling, and follow-up after an exposure. Such information as the date and time of exposure, job, and activity being performed by the worker at the time of exposure, details of the exposure including to what body fluid the patient was exposed, and HIV/HBV status of the source of exposure, if known, must be obtained as soon as possible after exposure.

If the source is HBV-positive or unknown, the exposed worker should be offered the HBV vaccine if the worker has not been immunized. Hepatitis B immunoglobulin should be offered to all workers who are unsure of their HBV status, particularly if the source is known to be HBV-positive.

In addition, consent and testing should be obtained from the source if the HIV status is unknown. If the source has AIDS or is HIV-positive or refuses to be tested, the worker should be evaluated clinically and serologically as soon as possible after exposure. If the worker is seronegative, the worker should be tested again at 6 weeks, 12 weeks, and 6 months postexposure. This recommendation is based upon the studies reported by Marcus and Chamberland that indicate that seroconversion of an exposed individual should occur within 3 months. The current practices assume that if a worker does not seroconvert within 6 months, then they will not convert as a result of the exposure in question.

The worker should be advised to report any acute illness, particularly if characterized by fever, rash, myalgia, fatigue, malaise, or lymphadenopathy, to their physician.

During this 6-month period, the worker should follow the Public Health Service recommendations for prevention of spread of HIV. The worker should be advised to refrain from blood, tissue, or organ donation, abstain from or use measures to prevent spread of HIV via sexual transmission, and should not breast feed.

If the source is HIV-negative, the worker does not need repeat serologic testing unless it is clinically indicated. All workers should be offered the test for HIV if they are concerned.[1,2,5]

Depending upon the type of exposure (percutaneous vs mucous membrane), the patient and the physician may elect to use zidovudine prophylaxis. The dose schedule varies at different institutions. At the National Institutes of Health, workers are treated with 200 mg every 4 hours (6 times daily) for a period of 6 weeks. The University of San Francisco uses the same dosage 5 times daily. Some clinicians give an initial dose of 400 mg within 1 hour after exposure if possible.

At the present time, data from human and animal studies is inadequate to assess the efficacy or safety of zidovudine prophylaxis after exposure. Prospective studies conducted by the CDC on health care workers indicate that there are documented failures in the use of postexposure zidovudine prophylaxis. This information is based upon a study of health care workers from 312 US health care facilities from August 1983 to June 1992. Therefore, if zidovudine prophylaxis is considered, the worker should be counselled concerning the rationale for postexposure prophylaxis, the risk of acquiring HIV in the workplace, the limitations of current knowledge concerning the safety and efficacy of zidovudine, as well as the known side effects including nausea, vomiting, headache, and fatigue. Additional studies including the use of appropriate animal models or clinical trials comparing the use of zidovudine to other agents are indicated to aid clinicians and health care workers facing this difficult dilemma.[13,78-82]

An informed consent supplied to the employee should emphasize the following points:

1. It is highly unlikely that you will be infected with HIV,
2. but because there is a small likelihood, you may elect prophylaxis with AZT (or other newer medication).
3. AZT (or other newer medication) may have the ability to reduce your risk of seroconversion.
4. The side effects of AZT (or later alternatives) include nausea, vomiting, headache, fatigue, as well as the possibility of decreased hematocrit.

Confidentiality of the employee/patient should be maintained at all times. The physician should be encouraged to enroll the patient in the CDC surveillance system, which would offer serologic testing. For further information, the practicing physician can contact the CDC National AIDS Hotline (1-800-342-AIDS) or their local health department.

Information concerning the latest CDC studies and published material offered including "Business Response to AIDS," can be obtained from The National AIDS Clearinghouse Resource Service, PO Box 6003, Rockville, MD 20849-6003; telephone number 1-800-458-5231.

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The Original Cliff-Hangers

[John Templer's] first interest was safety. But he quickly became fascinated with the esthetics of stairs and their history. He discovered that, early in their evolution, stairs and their kid brother, the ladder, were serious weapons of war. In Egyptian writing, the image of a ladder meant "siege." Pueblo Indians pulled up the ladders to their cliffside villages to keep out enemies. At Mesa Verde, in Colorado, the villagers carved a permanent stair into the cliff face with an ingenious twist: unless you knew the correct foot and hand with which to start your climb, you finished hanging in space unable to enter the village because the hand you had free to reach up for the final grip was on the wrong side of your body. In medieval European castles, to reach the first floor you often had to climb a stairway that could easily be destroyed to keep out attackers. Or the entrance stairway was positioned so that defenders on the walls could pepper it with rocks or pour boiling oil down onto it.

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