EDITORIAL

Caring for Healthcare Workers: A Global Perspective

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This issue of the journal reflects broadly upon the risks of bloodborne pathogen exposure—risks faced by healthcare workers (HCWs) everywhere. The articles cover an array of issues, including the impact of work schedules, healthcare settings, culture-specific practices, and the implementation of safety-engineered sharp devices on the occupational risk of injuries from sharp devices and blood contact.[1-6] It is a fitting occasion to reflect on the state of the art in providing a safe working environment for HCWs and to consider a future path towards equitable access to its basic elements.

It has been more than 2 decades since the first case of needlestick-transmitted infection with human immunodeficiency virus (HIV; then referred to as "human T-lymphotropic virus III") was reported in *The Lancet*, triggering a high alert for the exposure risk faced by HCWs.[7] Although life-threatening bloodborne pathogens had been a recognized risk to HCWs for at least a century, it was the epidemic of acquired immunodeficiency syndrome (AIDS) that delivered the wake-up call leading to remedial action. Today, infection from bloodborne pathogens, primarily HIV, hepatitis B virus (HBV), and hepatitis C virus (HCV), remains the most life-threatening occupational risk for HCWs. Despite this fact, we can take heart from the dramatic reduction that has occurred in the magnitude of this risk as a direct result of effective prevention initiatives during the past 20 years. It constitutes one of the remarkable success stories in the annals of public health practice.

As a public health target, HCWs are usually considered to be (and treated as) a narrow subset of the general population. But globally, their numbers are large and their impact is felt everywhere. The total number of HCWs worldwide is estimated to be 35.7 million, which is greater than the population of Morocco, the 35th most populous nation in the world.[8,9] HCWs provide care in every country and to every social and cultural group, in sophisticated and humble settings alike. Their global reach is matched only by the significance of their work. In all corners of the globe we depend on them for life-sustaining services.

The effective assault on bloodborne pathogens that plague HCWs began with the availability of the hepatitis B vaccine in 1982. In the United States in 1983, the incidence of HBV among HCWs was 3 times higher than the incidence in the general population; by 1995, it was 5 times lower. The annual incidence fell from 386 to 9 infected HCWs per 100,000. In the early 1980s, it was estimated that more than 12,000 HCWs were occupationally infected with HBV annually, resulting in an estimated 250 deaths per year.[10] Between 1990 and 1998, during which time high rates of HCW vaccination were achieved in the United States, only 13 cases of acute HBV infection in HCWs were reported.[11] The advent of the hepatitis B vaccine was a major advance in preserving the health and lives of HCWs.

The risk of occupational infection with HIV, although alarming, has never reached the scale of hepatitis B. As of 1997, a total of 94 documented and 170 possible cases of occupational HIV infection had been identified worldwide; nearly two-thirds of cases were reported from the United States.[12] Since then, 15 more documented cases have been identified.[13(p23),14] However, most countries, especially those with a high population prevalence of HIV infection, have never instituted surveillance systems that would capture data on such cases.

Although the development of an AIDS vaccine still eludes us, new treatments for HIV infection appear to have had an appreciable impact on the risk of occupational exposure and infection. In 1997, it was shown that postexposure prophylaxis with zidovudine alone after occupational blood exposure to HIV reduced the risk of seroconversion by more than 80%.[15] Combination antiretroviral drug regimens, introduced in 1997, are believed to be even more effective at preventing seroconversion in HIV-exposed individuals. Combination treatment has altered the risk equation for HCWs in other ways, as well.[16] Shortly after these drugs became widely available in 1997, there was a precipitous drop in the number of HIV-positive in-patients in US hospitals. The risk of HCWs being exposed to HIV dropped in direct proportion to the decline in the number of HIV-infected patients in hospitals. Furthermore, a low viral load, which is common in patients receiving combination drug therapies, is associated with reduced transmission risk when an occupational exposure to

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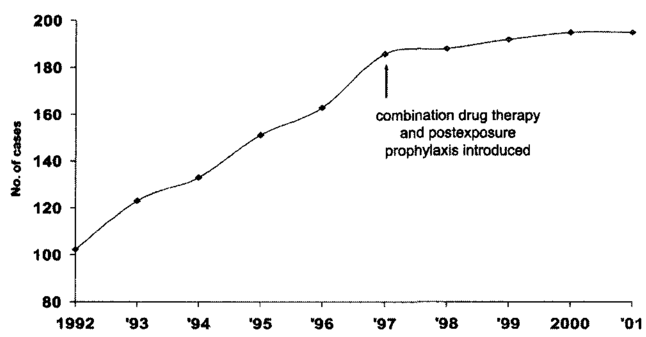

FIGURE 1. Cumulative number of cases of occupationally acquired human immunodeficiency virus infection among US healthcare workers during the years 1992-2001, as reported by the Centers for Disease Control and Prevention. Data include both documented and possible cases. Data sources: for 1992-1999, *HIV/AIDS Surveillance Report*[18]; for 2000, *Surveillance of Health Care Workers with HIV/AIDS*[19]; for 2001, Do et al.[20]

HIV occurs.[17] The cumulative effect has been a leveling off in the number of new cases of occupational HIV infection in the United States: no new documented cases and only 1 possible case of occupational HIV infection have been reported since December 2001, according to the Centers for Disease Control and Prevention (Figure 1).[21]

With regard to hepatitis C, there have been advances as well. Although there is still no vaccine against infection, nor any postexposure prophylaxis to prevent seroconversion after HCV exposure, advances in treatment have improved the prognostic outlook for HCV-infected HCWs. Interferon therapy has been successful in resolving both acute and chronic cases of HCV infection.[22] Although such treatment often has serious side effects and is not successful in all cases, HCWs are among the many benefiting from it, and it holds out the possibility of a cure.

Pathogen-specific advances are only part of the success story; primary prevention has played a significant role as well. Preventing at-risk blood exposures has benefits beyond pathogen-specific interventions. Exposure prevention, like a universal vaccine, addresses the entire array of pathogens—known and unknown—that pose a risk to HCWs. Although HBV, HIV, and HCV are the pathogens of most concern for HCWs, at least 30 more have been identified as having been occupationally transmitted to HCWs by percutaneous injury.[23] Many of these other pathogens are prevalent in tropical regions where the conditions for healthcare delivery are least safe for HCWs. Preventing exposures also eliminates the expense and personal impact of postexposure follow-up, as well as the potential side-effects of postexposure chemoprophylaxis and treatment regimens. Thus, despite the impressive gains in pathogen-specific interventions, primary prevention remains the strategy of choice.

Focus on the design-related risks posed by sharp medical devices associated with occupational transmission of bloodborne pathogens began with a study published in the *New England Journal of Medicine* in 1988.[24] The wide array of devices causing injuries to HCWs was categorized by design and function, and product design strategies for reducing injury risk among users were enumerated. These included the replacement of unnecessary needles, such as those used for accessing and connecting intravenous lines, with needleless devices. Such unnecessary needles caused 38% of needlesticks in the 1988 study[24]—the proportion of injuries that could be eliminated by product substitution. Numerous safety-engineered designs for "necessary" needles and other sharp devices were gradually introduced during the 1990s in the

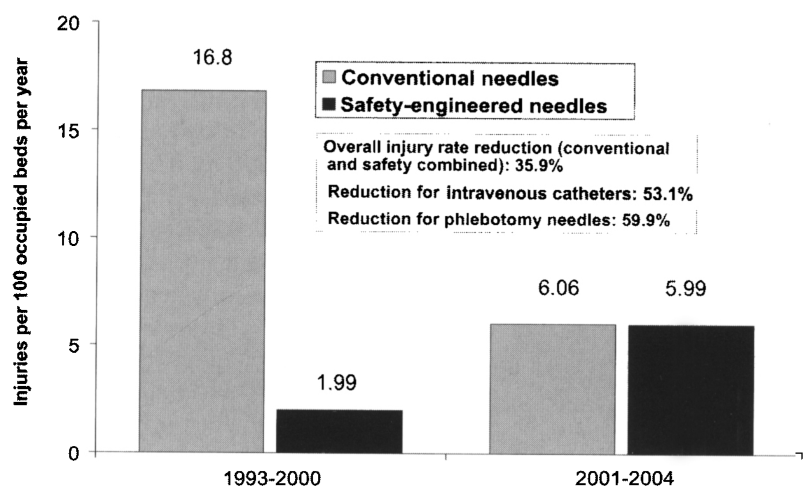

FIGURE 2. Percutaneous injury rates for all hollow-bore needles before and after passage of the Needlestick Safety and Prevention Act.[27] Data are for 87 hospitals and a total of 14,301 percutaneous injuries. Data from Exposure Prevention Information Network (EPINet), International Healthcare Worker Safety Center, University of Virginia.

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United States and, to a lesser degree, in other industrialized countries; protective features on these devices included mechanisms to shield, blunt, or retract the needle in order to protect the user's hands during disposal.

This new generation of devices has shown a high degree of safety efficacy, especially those used for vascular access and drawing blood, the procedures that are associated with the greatest risk of bloodborne pathogen transmission. The study by Lamontagne et al.[3] in this issue showed a 74% reduction in the number of injuries from needles for drawing blood after the introduction of safety-engineered alternatives. Two earlier studies documented reductions of 83%[25] and 89%[26] in the number of needlesticks after the introduction of safety-engineered intravenous catheters.

The widespread availability of safety-engineered needles and sharp devices in the United States in the 1990s and the documentation of their effectiveness were key factors in the passage of the landmark Needlestick Safety and Prevention Act of 2000—the first national law in the world that makes provision of safety-engineered devices to HCWs mandatory.[27] The impact of this law in reducing HCWs' risk has been, and will continue to be, proportional to healthcare employers' compliance with adopting safety-engineered devices across the spectrum of device categories.

The Exposure Prevention Information Network (EPINet) surveillance database, which tracked percutaneous injuries among HCWs in a total of 87 hospitals in 1993-2004, showed an overall 36% decline in rates of injury from hollow-bore needles when comparing data for 1993-2000 (before passage of the needlestick prevention act) with data for 2001-2004 (after passage of the act). Figure 2 shows the overall shift in the proportions of injuries attributed to conventional devices and to safety-engineered devices. With respect to specific categories of devices, those associated with the highest transmission risk reflected the greatest declines in injury rates—a 56.4% reduction for intravenous catheters and a 59.9% reduction for phlebotomy needles. These observations confirm that the new technology, backed by a national law, has yielded meaningful benefits to HCWs by reducing injury rates. Even greater reductions in rates can be achieved with further increases in the adoption of safety-engineered devices and fuller compliance with the law.

Measures such as vaccination, postexposure prophylaxis, and new treatments targeting HBV, HIV, and HCV, in combination with use of safer medical devices that reduce risk of injury and exposure to blood, have resulted in historic levels of protection for HCWs against occupational infection from bloodborne pathogens. Clearly we have both the knowledge and technology to effectively protect HCWs from the risk of infection with bloodborne pathogens.

The contradiction we face today is that, despite all we know and all we can do, most HCWs around the world do not have access to these disease-preventing, life-preserving measures. The tragic irony of the present situation is that the HCWs at greatest risk—those in countries where the prevalences of bloodborne pathogens in patient populations are highest—are afforded the least protection. In resource-limited countries, HCWs are not systematically vaccinated against hepatitis B. Although their training is often subsidized by their governments, the expense of protecting that national investment by providing a life-saving vaccination is most often viewed as optional. Also seen as optional in most parts of the world are the safety-engineered medical devices that are now required in the United States. They are gradually being adopted elsewhere—first in countries that can most readily afford them, and last in countries that need them most.

The basic measures for protecting HCWs from the life-threatening risk of bloodborne pathogen infection should be viewed everywhere as essential and included in the national health priorities of all nations. The resources for this task are unlikely to be forthcoming unless we reassess the value we place on HCWs. They are not merely a service commodity; they are an invaluable asset to their countries and to the world community. Without them there would be no health care. All of us benefit from protecting their lives and health.

Securing the commitments and resources to address this pressing need will not be a small challenge. Novel strategies must be considered. The Clinton Foundation has provided a creative model by overcoming seemingly insurmountable barriers and negotiating with industry and national governments to make AIDS drugs accessible and affordable in African countries. We must make a similar effort on behalf of HCWs and the measures to protect them. It is in our interest to do so.

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