

*Sounding Board***RISKS TO HEALTH CARE WORKERS
IN DEVELOPING COUNTRIES**

THE first report of a health care worker infected with the human immunodeficiency virus (HIV) by a needle stick, published in the medical literature in 1984,¹ launched a new era of concern about the occupational transmission of blood-borne pathogens. In the United States, universal precautions were implemented,² regulations such as the Bloodborne Pathogens Standard were issued,³ and the rate of vaccination against hepatitis B virus (HBV) among health care workers increased dramatically.⁴ After a decade of phenomenal technological advances in sharp devices engineered for safety, the federal Needlestick Safety and Prevention Act, requiring the use of safer devices, became law in November 2000.^{5,6}

THE RISKS

Protecting health care workers in developing countries, however — where even the basics of medical care are difficult to provide and where the protection of health care workers does not appear on any list of health care priorities — is a formidable challenge. It is all too easy to ignore a problem about which there are few data. Clearly, health care workers in developing countries are at serious risk of infection from blood-borne pathogens — particularly HBV, hepatitis C virus (HCV), and HIV — because of the high prevalence of such pathogens in many poorer regions of the world.^{7,8} HBV and HCV, for example, are endemic in sub-Saharan Africa. A study involving 803 schoolchildren in Ghana found that 61.2 percent had at least one marker of HBV infection and reported a seroprevalence of anti-HCV antibodies of 5.4 percent.⁹ Of 303 subjects in three villages in Gabon, 19 percent were carriers of hepatitis B surface antigen, and in one village, 24 percent of subjects had HCV antibodies.¹⁰ By contrast, the prevalence of HBV and HCV in the U.S. population is approximately 4.9 percent and 1.8 percent, respectively.^{11,12} Furthermore, other lethal blood-borne pathogens, including Lassa virus, Ebola virus, and other hemorrhagic fever viruses, are endemic in some of the same tropical regions.⁷

Although the prevalence of blood-borne pathogens in many developing countries is high, documentation of infections caused by occupational exposure in these countries is scarce. Seventy percent of the world's HIV-infected population lives in sub-Saharan Africa, but only 4 percent of worldwide cases of occupational HIV infection are reported from this region.^{13,14} By contrast, 4 percent of the world's HIV-infected population lives in North America and western Europe, yet 90 percent of documented occupational HIV in-

fections are reported from these areas (Fig. 1).^{13,14} It is unlikely that surveillance and reporting of occupational exposure to infected blood will be undertaken in places where postexposure prophylaxis, treatment, and workers' compensation are lacking.

In developing countries, the risk of occupational transmission of blood-borne pathogens is increased by the excessive handling of contaminated needles that results from some common, unsafe practices.^{7,8,15-22} These include the administration of unnecessary injections on demand, the reuse of nonsterile needles when supplies are low, and the unregulated disposal of hazardous waste. Such practices pose risks of disease transmission to health care workers, patients, and communities at large.

In many developing countries, the high demand for injections derives from the belief that they are more effective than other forms of treatment. In Ghana, 80 to 90 percent of the patients who visited a health center received one or more injections per visit.²³ Similar findings have been reported in Uganda and Indonesia.²³ A correlation has been documented between the frequency of injections and the prevalence of HBV, HCV, and HIV in the population.^{7,8}

Although many developing countries are replacing sterilizable syringes and needles with "auto-disable" and standard disposable syringes, where sterilization is still practiced it is often incomplete.²⁴ Improperly sterilized injection equipment has been associated with outbreaks of HBV infection, Ebola fever, Lassa fever, and tetanus.^{7,8}

Unnecessarily hazardous diagnostic equipment, such as nonretracting finger-stick lancets and glass capillary tubes (both of which have been associated with the occupational transmission of HIV^{14,25}), is routinely used in developing countries to test for common tropical diseases such as malaria and filariasis. More than 100 million tests for malaria are performed each year.²⁶ Because much of this testing is done in outreach programs, hazardous equipment endangers not only health care workers but members of the community as well — especially children, who may be tempted to play with blood-contaminated devices that have not been securely contained. Despite the availability of plastic or plastic-wrapped capillary tubes and automatically retracting lancets, which could nearly eliminate this risk,^{27,28} no formal recommendations have been made regarding incorporating the safer equipment into programs designed to eradicate tropical diseases.

Further exacerbating the risk to health care workers in developing countries is a lack of gloves, gowns, masks, and goggles to protect them from contact with blood. It was recently reported in Tanzania that birth attendants cover their hands with plastic bags to protect themselves from exposure to HIV during deliveries because there are no gloves available.²⁹ There is also a lack of safe disposal systems for the secure containment and elimination of contaminated waste.²⁴

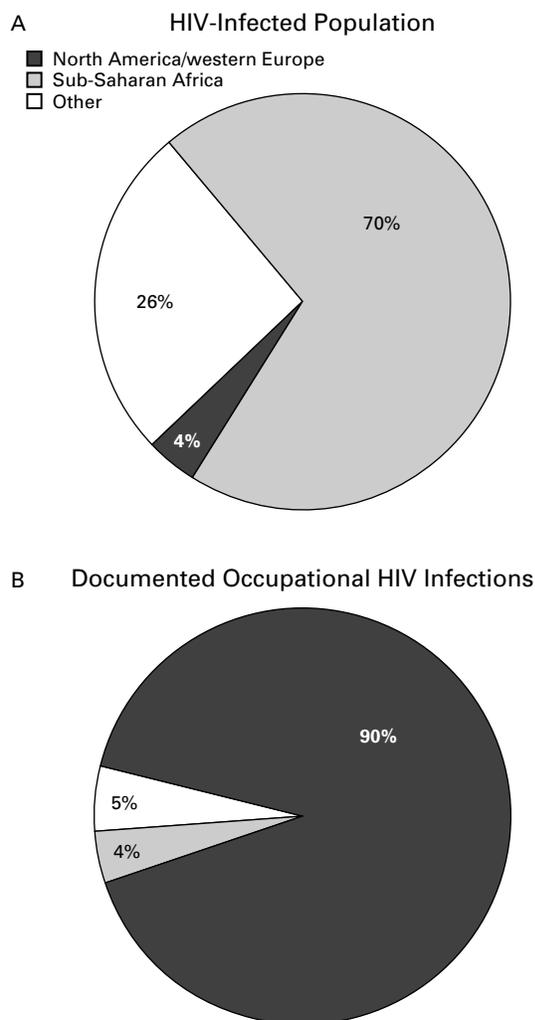


Figure 1. Distribution of the HIV-Infected Population (Panel A) and of Documented Occupational HIV Infections (Panel B) Worldwide. The data in Panel A are from the Joint United Nations Program on HIV/AIDS and the World Health Organization.¹³ The data in Panel B are from Ippolito et al.¹⁴ Percentages do not total 100 because of rounding.

THE COSTS

Protecting health care workers in developing countries from exposure to blood-borne pathogens will involve some cost. In industrialized countries, the cost of protective devices and equipment that reduce blood exposure may be offset by lower expenditures associated with postexposure testing and prophylaxis, medical treatment of infected workers, institutional insurance premiums, and workers' compensation payments.^{30,31} In most developing countries, however, similar economic incentives do not exist; there is little reason for postexposure follow-up in countries that cannot afford prophylaxis, treatment, and compensation benefits.

Nevertheless, there are costs associated with failing

to protect health care workers in developing countries. The loss of a wage-earning health care worker can be devastating to the financial security of the worker's family. The loss of health care workers can also have a disproportionate effect on the fragile health care infrastructure of developing countries, where trained health professionals are scarce in relation to the overall populations they serve. Statistics from the World Health Organization (WHO) indicate that there are fewer than 10 physicians per 100,000 population in 15 sub-Saharan countries, as compared with nearly 250 physicians per 100,000 population in the United States.³² Similar discrepancies exist between the numbers of nurses in these countries and the number of nurses in the United States. Any reduction in the work force further strains understaffed and overextended health care systems. Possibly the largest unrecognized cost of failing to protect health care workers is the loss of the national investment in the training of workers whose careers are cut short by occupationally acquired infections.

A comprehensive cost-benefit analysis of measures to improve the safety of health care workers in developing countries has yet to be undertaken. However, one study, in which the cost of syringe-transmitted disease was factored into the cost-benefit equation, found that switching to a higher-cost syringe with an auto-disable feature to prevent recycling and reuse would result in significant long-term savings in several sub-Saharan countries (Ekwueme DU, Centers for Disease Control and Prevention: personal communication). The total cost per injection with the use of auto-disable, standard disposable, and sterilizable syringes was estimated on the basis of the cost of the equipment, the direct cost of medical treatment for HBV and HIV transmitted by nonsterile, reused syringes, and the indirect cost of lost years of productivity and lost years of life for infected persons. On the basis of this more comprehensive model, the mean cost per injection in Uganda was estimated to be more than five times as high for a standard disposable syringe as for an auto-disable syringe. Similar studies are needed to assess the cost-benefit ratio associated with providing protective equipment, such as safety needles and protective gloves, to health care workers in developing countries. When conducting cost-benefit studies of conventional as compared with safety devices, the cost of treating occupationally transmitted disease and the lost investment in medical and nursing education must be included.

CONCLUSIONS

Health care workers are a crucial resource in the health care systems of developing nations. In many countries, including those in sub-Saharan Africa, workers are at high risk for preventable, life-threatening occupational infections. Yet the protection of health care workers in these countries is largely ne-

glected in national priorities for health care and by the international organizations that fund health care initiatives. We must not delay the implementation of effective prevention strategies while we await more data.

International guidelines, endorsed by the appropriate international agencies, are needed to define medically indicated and inappropriate uses of medical needles. Implementing such guidelines should substantially reduce the number of injections that are given and, in turn, the incidence of occupational exposure to blood and cross-infection between patients.

Training and education in injection safety, prevention of sharps injuries, and universal precautions must be incorporated into the curriculum in medical and nursing schools in developing countries. Health care workers must be instructed to limit the use of needles strictly to medically indicated purposes. In addition, sustained public-education campaigns are needed to dispel much misinformation about injections.

Suppliers of diagnostic test kits that rely on the sampling of capillary blood should be required to bundle noninjurious devices with their kits, including plastic or plastic-wrapped capillary tubes and automatically retracting finger-stick lancets. The safe containment of injection-related waste depends on improvements in the disposal systems for medical waste. International standards must be established for the placement, the puncture resistance, the fluid resistance, the sealing mechanisms, and the transportability of sharps-disposal containers.

HBV-vaccination programs for health care workers are needed in areas where the prevalence of HBV is high. Priority should be placed on vaccinating the health care workers who are at the greatest risk of contact with blood and body fluids. Sentinel surveillance systems are needed in selected developing countries and geographic regions to identify high-risk practices and devices and to help in the planning and testing of effective interventions. Good decisions regarding the allocation of limited financial and material resources require accurate data.

Protective measures for health care workers must be part of every program supported by international organizations for the prevention of the spread of HIV and AIDS and other infectious diseases. The WHO Department of Vaccines and Biologicals has already set a precedent in this area by officially promoting improved standards of injection safety to prevent the transmission of disease among health care workers and patients alike.^{33,34} WHO urges immunization programs to make a complete transition to auto-disable syringes by 2004 and promotes the bundling of auto-disable syringes and puncture-proof disposal containers with vaccines.

Other organizations need to follow the example set by WHO. The World Bank has committed \$1.7 billion to HIV- and AIDS-related projects in more than 51 countries.³⁵ One of the primary aims of the pre-

vention initiatives it supports in developing regions is increasing the availability and use of condoms in at-risk populations.³⁶ However, the use of protective gloves by birth attendants during deliveries is no less important for preventing the transmission of HIV. Therefore, these same prevention programs should also support increased access to procedure gloves and barrier garments for birth attendants and other health care workers who are at risk for contact with blood.

Along with international agencies, national budgets should provide resources to ensure the safety of medical personnel. These expenditures should not be viewed as an increase in the cost of health care in developing nations but, rather, as insurance to protect each nation's investment in its health care work force. The inevitable consequence of continued inattention will be a mounting toll of disease and death among productive health care workers in places where their loss can least be afforded.

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