

## Letter to the Editor

### Assessment of Occupational Exposure to Human Immunodeficiency Virus and Hepatitis C Virus in a Referral Hospital in Burundi, Central Africa

#### To the Editor:

The occupational risk of viral infection among healthcare workers (HCWs) is well documented. Although universal precautions were established many years ago,<sup>1</sup> their application is difficult in developing countries, owing to organizational problems and a lack of necessary materials such as gloves and proper needle-disposal facilities.<sup>2</sup> Data on the frequency and circumstances of occupational exposures in developing countries are sparse.<sup>2</sup> We report data from Burundi, a country with high rates of human immunodeficiency virus (HIV) and hepatitis C virus (HCV) seroprevalence, based on a questionnaire that surveyed HCWs and auxiliary staff regarding perceptions of occupational exposure, frequency of exposures as defined by Centers for Disease Control and Prevention criteria,<sup>1</sup> circumstances of exposures, and postexposure practices. We also estimated a cumulative risk for seroconversion to HIV and HCV due to parenteral exposure based on data from the survey.

Kamenge University Hospital is located in Bujumbura, the capital of Burundi. It is a 450-bed referral center with 344 HCWs and auxiliary staff members. Reporting exposures is not mandatory, and exposed workers are not observed. All materials and care procedures are paid for by the individual exposed. Since 1993, the sociopolitical crisis in Burundi has led to a marked reduction in protective measures, including gloves, sterile injection equipment, and containers for disposing of used needles and blades, which are often reused.

The questionnaire was completed by 219 HCWs and auxiliary staff (63% of all staff). All categories of staff

TABLE

FREQUENCY OF OCCUPATIONAL EXPOSURES AND POSTEXPOSURE PRACTICES AMONG 219 STAFF MEMBERS AT KAMENGE UNIVERSITY HOSPITAL, BURUNDI

	Physicians and Interns (n = 65)	Nurses (n = 104)	Nursing Assistants (n = 29)	Auxiliary Staff (n = 21)	P*
At least 1 accident in the past 12 mo	69%	75%	41%	62%	.008
Average no. of exposures in the past 12 mo	2.4	3.5	1.2	1.7	.06
Procedure following last exposure					
Adequate washing	52%	51%	42%	23%	.25
Wound bleeding	61%	88%	89%	70%	.04

\*Fisher's exact test or analysis of variance.

were represented, with 65 physicians and interns (62% of individuals in this category), 104 nurses (81%), 29 nursing assistants (53%), and 21 auxiliary staff members (45%). The mean length of service was 2.5 years among physicians and interns, and 8.5 years among other categories of staff. Answers to open-ended questions on perception of occupational risks showed that physicians, nurses, and nursing assistants felt more at risk for HIV infection (91%, 94%, and 90%, respectively) than did auxiliary staff (67%;  $P = .006$ ). The corresponding rates for HCV were 83%, 75%, 41%, and 24%, respectively ( $P < .001$ ).

Injuries with contaminated sharps or splash exposures were reported by 174 individuals (79% of the respondents), of whom 148 (68%) had had at least one exposure and 55% had had a needlestick injury during the previous 12 months. The estimated average number of exposures per individual per year was 2.7 (needlesticks, 1.2; cuts, 0.2; exposure of damaged skin, 0.7; and splash, 0.7). The reported frequency of these exposures varied across the staff categories (Table). As in other studies, a higher frequency of exposures was reported by nurses, interns, and physicians,<sup>2,3</sup> but exposure of assistant nurses and auxil-

iary staff was also relatively frequent.

The types of activities involved in exposures were studied by asking respondents to describe their last exposure in detail. More than half (54%) of the exposures involved needles used during clinical procedures (blood sampling, 17%; venipuncture, 13%; injections, 9%; intravenous line insertion, 12%; and arterial blood sampling, 3%). Other activities included cleaning or garbage disposal (16%), surgical procedures performed outside the surgical department (8%), and such things as sample decanting and patient washing (6%). Twenty-six percent of exposures involved needle recapping, 14% involved discarded materials, and similar to other studies,<sup>3,4</sup> 32% involved unexpected movements of the patient or another individual. Approximately 40% of exposures occurred after clinical procedures and could therefore have been avoided if proper disposal procedures had been followed.

Only 48% of respondents reported applying adequate procedures after exposure as recommended by the French Ministry of Health,<sup>5</sup> defined as wound cleaning with soap and water followed by disinfection or as washing after splash exposure. The wound was bled after 80% of sharps

exposures, a practice that is not recommended.

Glove use was reported by all respondents, although 74% said they did not always wear gloves in circumstances such as emergencies (nearly 50% of nurses) or because of discomfort (nearly one-third of the nurses). Glove availability was a major problem, being cited as a limiting factor by 45% of the respondents. Disposal containers were seldom available, scalpel blades were removed manually from the handle by approximately 50% of the respondents, and 16% of the nurses never recapped needles. Only 14% of the respondents who reported an exposure during the previous 12 months had sought medical advice. The staff expressed a wish for better exposure management, 85% stating that they would like to be able to seek advice from someone competent to provide such advice (a physician, for 69% of respondents).

The cumulative occupational risk after 10 years in practice, with an average of  $N$  exposures per year, can be estimated as  $1 - (1 - FP)^{N \times 10}$ , where  $F$  is the risk of transmission following occupational exposure and  $P$  is the seroprevalence rate among patients.<sup>6</sup> We used an  $F$  value of 0.3%,<sup>7</sup> a  $P$  value of 40% for the internal medicine department (as estimated in a cross-sectional survey), and a  $P$  value of 18% for other departments (derived from the prevalence estimated in a recent national serosurvey among randomly selected 15- to 44-year-old subjects).<sup>8</sup> The cumulative 10-year risk of HIV seroconversion was estimated at 1.2%, 2.4%, and 3.5% with 1, 2, and 3 exposures per year, respectively, in the internal medicine department; and 0.5%, 1.2%, and 1.6% in other departments. With the assumption of an HCV seroprevalence of 6% among the hospital's patients (prevalence among blood donors in Bujumbura)<sup>9</sup> and hypothetical risks of seroconversion of 3% and 10% per exposure,<sup>10</sup> the esti-

mated cumulative 10-year risk of contracting HCV infection for a given staff member would be 3.5% and 11.3%, respectively, with an average of 2 exposures per year.

The high HIV seroprevalence among patients in this hospital and their generally advanced stage of disease creates a high risk of occupational infection among staff, which is further increased by the large number of accidents. The risk is not limited to nurses and physicians; we found that auxiliary staff, who have not been surveyed in previously published studies, were also frequently exposed, particularly to materials discarded by other HCWs and inappropriate waste disposal. The unavailability of the materials required to implement universal recommendations is obviously an obstacle in developing countries and reinforces the need for local studies in order to adapt prevention guidelines.<sup>2</sup> Our minimum estimates of the cumulative risk of HIV seroconversion are comparable to those reported among surgeons in Zambia and Tanzania.<sup>6,11</sup> The occupational risk of HCV infection has not previously been estimated in sub-Saharan Africa, despite a community HCV seroprevalence exceeding 5% in central Africa. The results of our survey led the hospital management to develop a comprehensive prevention program including the creation of a position for an occupational health nurse to organize information and training for risk prevention.

## REFERENCES

- Center for Disease Control. Recommendations for prevention of HIV transmission in health-care settings. *MMWR* 1987;36:1S-18S.
- Sagoe-Moses C, Pearson RD, Perry J, Jagger J. Risks to health care workers in developing countries. *N Engl J Med* 2001;345:538-541.
- Karstaedt A, Pantanowitz L. Occupational exposure of interns to blood in an area of high HIV seroprevalence. *S Afr Med J* 2001;91:57-61.
- Gershon R, Pearce L, Grimes M, Flanagan P, Vlahov D. The impact of multifocused interventions on sharps injury rates at an acute-care hospital. *Infect Control Hosp Epidemiol* 1999;20:806-811.
- French Ministry of Health. *Bulletin Épidémiologique Hebdomadaire*. Paris: French Ministry of Health; 1998. Available at [www.invs.sante.fr/beh/1998/9825/index.html](http://www.invs.sante.fr/beh/1998/9825/index.html).
- Consten E, van Lanschot J, Henny P, Tinnemans J, van der Meer J. A prospective study on the risk of exposure to HIV during surgery in Zambia. *AIDS* 1995;9:585-588.
- Easterbrook P, Ippolito G. Prophylaxis after occupational exposure to HIV. *BMJ* 1997;315:557-558.
- Niyongabo T, Henzel D, Ndayishimye JM, et al. Nutritional status of adult inpatients in Bujumbura, Burundi (impact of HIV infection). *Eur J Clin Nutr* 1999;53:579-582.
- Ndhiokubwayo JB, Ntirandekura D, Nzotungwanayo I, De Lamballerie X. Virus de l'hépatite C: premier pathogène trouvé chez les donneurs de sang au Burundi. *Med Trop (Mars)* 1999;59:307.
- Gerberding J. Management of occupational exposures to blood-borne viruses. *N Engl J Med* 1995;332:444-451.
- Gumudoka B, Favot I, Berege ZA, Dolmans WM. Occupational exposure to the risk of HIV infection among health care workers in Mwanza Region, United Republic of Tanzania. *Bull World Health Organ* 1997;75:133-140.

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