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Trends in Human Immunodeficiency Virus Infection

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Within a remarkably short period, the acquired immunodeficiency syndrome (AIDS) has become one of the major public health problems of the world. As of 28 February 1989, 141,894 cases of AIDS had been reported worldwide (1). All continents are affected, cases being reported from 145 (82 %) of the 177 countries participating in the epidemiologic surveillance system of the World Health Organization (WHO). Underreporting distorts the true extent and trends of AIDS, especially in some developing countries where the problem is known to be more serious than reported cases indicate. In September 1988, the WHO estimated that there were actually over 250,000 cases of AIDS worldwide, with 5 to 10 million persons infected with the human immunodeficiency virus (HIV) (2).

The detection of trends of AIDS and HIV infection – who becomes infected, when, where, and why – is critically important for anticipating future health service needs, budgeting the required financial resources, targeting prevention and control strategies to appropriate subgroups in the population, and, finally, for evaluating the effectiveness of these interventions.

The early detection of such trends in HIV infection is very difficult. Surveillance of AIDS cases has been the major epidemiologic frame of reference for the epidemic. This information has proved critical to our understanding of the magnitude and distribution of the disease throughout the world.

AIDS surveillance, however, has certain limitations. First, the case definition of AIDS classifies only the most advanced stages of immunosuppression that result from HIV infection; these stages occur many years after infection. Trends detected by a surveillance system based on counting AIDS cases will, therefore, only reflect changes in the acquisition of HIV infection that occurred years earlier. Second, as understanding of this syndrome has increased and diagnostic practices have changed, the surveillance definition of AIDS has been updated (3, 4), making precise comparisons over time more difficult. Furthermore, surveillance definitions of the disease vary, especially between industrialized and developing countries (5–7), and even within some countries definitions are not applied consistently because of differences in diagnostic practices and available resources.

Surveillance of HIV infection itself, using standardized sampling techniques and laboratory tests, is vital for close monitoring of the epidemic and is an important complement to existing surveillance of AIDS cases. Since serologic tests for HIV became available in 1985, hundreds of seroprevalence surveys have been performed throughout the world in various population groups, such as prostitutes, sexually-transmitted disease (STD) clinic patients, homosexual men, blood donors, persons with hemophilia, intravenous drug abusers, hospital workers, hospitalized patients, military applicants, and others. Results of such serosurveys should be interpreted with caution because of the possibility of selection bias and volunteer bias in the enrollment of participants in particular studies. For example, prostitutes or homosexual men selected because of their attendance at an STD clinic may not be representative of these groups in the population. Moreover, persons who refuse to be tested can distort the findings. Hull et al. (8) found that 0.7 % of 1,146 persons willing to be tested and informed of the results in an STD clinic were seropositive, compared to 3.8 % of 237 patients from the same clinic who had refused voluntary testing but were later tested blindly using anonymous sera collected for other tests.

HIV incidence – the number of new infections occurring during a specific period – has been studied in specific population cohorts to detect and quantify seroconversion rates in previously seronegative persons. Such prospective studies are expensive and cumbersome, but they provide reliable information on trends in the incidence of HIV infection (9–11). However, data obtained in a specific cohort may not be generally applicable to other populations. Until now, few incidence studies have been performed, and all except two (12, 13) have been done in high risks groups.

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In the USA, HIV seroprevalence increased rapidly in the early 1980s in the two risk groups in which AIDS was first discovered. HIV seroprevalences of 20–50 % in homosexual and bisexual males and 50–60 % in i.v. drug abusers have now been reported in certain cities (10). Seroincidence studies have shown marked declines, however, in the rates of new infection in cohorts of homosexual men in San Francisco (9) and other cities since 1985 (10), suggesting that behavior has changed towards safer sexual practices in members of these cohorts (14). Declines in the incidence of syphilis (15) and gonorrhea (16, 17) among homosexual men in different cities throughout the world provide additional indirect evidence of changed sexual behavior. On the other hand, the marked overall increase in cases of syphilis in the USA suggests that despite the risk of HIV infection, high risk sexual activity is increasing or at least not decreasing outside the homosexual community (18).

There is much less evidence that i.v. drug abusers are making behavioral changes to reduce their risk of HIV infection. HIV seroprevalence in this group has continued to rise worldwide. In Italy and Spain more than half of all AIDS cases are now occurring in i.v. drug abusers (2). In Bangkok, HIV seroprevalence among i.v. drug abusers rose from 0 % in 1985 (19) to 16 % in early 1988 (2).

Heterosexual transmission in the USA is gradually accounting for a greater proportion of reported AIDS cases. The proportion of reported AIDS cases associated with heterosexual contact increased from 1.1 % in 1982 to 3.6 % in 1988 (20). The introduction of the virus into these heterosexual Americans resulted mainly from sexual contact with i.v. drug abusers, with a much smaller proportion infected through sexual contact with bisexual men, persons with hemophilia, transfusion recipients, or prostitutes (21). In the USA, HIV prevalence remains very low in heterosexual persons not using i.v. drugs and without known sexual contact with persons at increased risk for HIV (10). Seroprevalence rates have remained stable at much less than 1 % during a 33-month period among first-time blood donors, and during a 15-month period among patients in sentinel hospitals (20).

In some countries in Central and South America, transmission appears to be heterosexual in an increasing proportion of AIDS cases. In Brazil – a country in which homosexual men account for most AIDS cases – the percentage of cases 15 years of age and over who acquired HIV infection through heterosexual contact rose from 3.7 % in 1982–1984 to 10.3 % in 1988 (22).

Most countries of sub-Saharan Africa face serious public health problems as a consequence of HIV infection. Rapid increases in HIV seroprevalence have been seen in prostitutes in several African capitals in recent years, much as in homosexual men in certain US cities. In Nairobi, for example, prostitutes from a low socioeconomic area who were tested in 1981 had a seropositivity rate of 4 %; testing in 1988 in a similar population revealed that 88 % were positive (23).

HIV testing in general populations of several large cities in central Africa revealed seropositivity rates of 4 % to 15 % (2, 23). In contrast, HIV seroprevalence still remains low in some rural areas of Africa that have been studied (24, 25). In the Equateur Province in Zaire, for example, HIV seroprevalence remained stable at 0.8 % between 1976 and 1986 (24). In other rural areas, however, such as the Rakai District in Uganda (26) and the Kagera Region in Tanzania (27), high prevalence rates of HIV have been reported. These high rates were probably the result of changes in traditional life styles and behavior resulting from social disruption, war, and the transit of truckdrivers along international highways.

Incidence studies conducted in hospital workers in Africa indicate annual rates of transmission that are substantial, but not as high as those in prostitutes. For example, studies of hospital workers in Zaire showed seroincidence rates of 0.7 % (12) to 1.6 % (13) per year. There was no relationship with type of job or frequency of patient contact, suggesting that the vast majority of infections in these workers were acquired through sexual contact.

Since HIV screening of blood products before transfusion was instituted, new HIV infections through this route have diminished markedly in industrialized countries. Technical and financial constraints limit HIV testing in many developing countries, however, where substantial transmission via blood products continues. Some improvement in this serious problem can be expected with the ongoing development of rapid, technically simple and inexpensive diagnostic reagents for detecting antibody to HIV (28).

Neither effective treatment of existing HIV infections, nor vaccination to prevent future infections can be expected to become readily available in the next few years. If we hope to influence the trends of HIV infection in the near future, our success will depend largely on the degree to which educational efforts can be mobilized to effect the behavioral changes necessary to block transmission of HIV. There is room for optimism in this regard. Behavioral changes that limit the spread of HIV are possible, as demonstrated in cohort studies in homosexual men (9, 10, 14), and in intervention projects with prostitutes in Kenya (11) and with heterosexual couples with one infected partner in Zaire (K. Irwin, personal communication). In these cases, the method used was distribution of free condoms and intensive counselling to motivate individuals to use condoms for sexual intercourse. In the Kenya study, for example,

before counselling 7–10 % of the prostitutes reported occasional use of condoms; after counselling, 58–80 % reported at least some condom use (11). Twenty (71 %) of 28 women who were not condom users seroconverted compared with 23 (46 %) of 50 women who reported some use of condoms.

Health educators, public health officials, health care providers, and scientists alone cannot solve the problem. Some responsibility for the epidemic must be ascribed to the social and economic conditions that are conducive to drug abuse, prostitution and promiscuous sexual activity – three forms of behavior that have played an important role in the spread of HIV throughout the world. Leadership and support from political policymakers will be required to address these underlying problems and to provide resources for the massive efforts needed to change behavior, which is the major method likely to be available to us in the next few years to control the HIV epidemic.

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