Acquired Immunodeficiency Syndrome (AIDS)

A global challenge

by Jonathan Mann

The Acquired Immunodeficiency Syndrome (AIDS) and the entire spectrum of disease associated with human immunodeficiency virus (HIV) infection has recently and rapidly become a problem of intense international interest and concern. HIV disease is not simply one of a series of newly emerging diseases during the past decade, but has several biological and epidemiological features which together justify a unique sense of urgency among public health officials, physicians, political leaders and the general public.

The aetiologic agent of AIDS, the HIV virus, differs in important ways from more traditional human viral pathogens such as hepatitis B, poliovirus or measles virus. HIV attacks elements of the immune system and the nervous system (brain), and results in an infection most virologists believe to be lifelong. The factors influencing the viral activity level are currently unknown, but it is clear that the virus can move readily from a resting or dormant state to intense activity. This results in a breakdown of body resistance and subsequent disease manifestations of varying severity.

The full range of disease expressions of HIV infection are not yet fully known. AIDS, the most severe currently recognised consequence of HIV infection, is characterised by destruction of key elements in the host immune system, resulting in a series of severe, and ultimately fatal, opportunistic infections and malignancies. Available evidence predicts that at least one to two per cent of HIV infected persons will develop AIDS each year.

A series of severe yet lesser clinical manifestations of HIV infections are classified as the “AIDS-related complex” or ARC. Persons with ARC suffer ill health in the form of chronic fever, diarrhoea, weight loss, night sweats and swelling of lymph glands. Current data suggest that approximately five to ten per cent of HIV infected persons will develop ARC each year. ARC cases are also at increased risk of progressing to AIDS itself: again five to ten per cent per year.

HIV also behaves like a “slow virus” infecting the central nervous system. It appears responsible for a variety of neurological syndromes, ranging from acute inflammation of the brain to chronic dementia. The relatively recent discovery of HIV virus and the short observation period of known infected persons limit the ability to predict the eventual neurological burden associated with HIV. Manifestations of sub-acute and chronic HIV infection of the brain may only become evident during the next 10 to 30 years. Nevertheless, the possibility clearly exists that neurological damage may represent the most destructive aspect of HIV infection.

Finally, other adverse consequences of HIV are likely to emerge during the next decade. Given the central role of the immune system in a wide range of disease states, especially malignancies and “auto-immune” diseases, the results of HIV-associated immunological dysfunction may be far-reaching. In summary, the ultimate health impact of HIV infection, including effects on future generations, is unknown, and the currently recognised syndromes constitute an unknown portion of the HIV problem.

The infection of sexually active women creates the problem of perinatal transmission of HIV. The likelihood that an infected mother will transmit HIV to her newborn child is estimated to be 25 to 50 per cent. Therefore, in those areas of the world where eight to ten per cent of pregnant women are infected, as many as two to five per cent of all newborn children may be infected with HIV during the perinatal period.

As a result, the HIV-infected person, even when he or she feels healthy, faces a distinctly uncertain future, with
a risk of approximately ten per cent of developing AIDS, a 25 per cent risk of ARC, and an unknown risk of nervous system affections during the initial five years after infection. The annual risk for infected persons of developing AIDS or ARC may remain constant or even increase during the first five to seven years after infection, and the ultimate cumulative risk for infected persons is unknown. In population terms, therefore, the scope of the HIV problem cannot be measured in terms of current AIDS cases. As more years of observation accumulate, a clearer picture will emerge. Current estimates suggest that, in the developed and developing world, there are approximately 50 to 100 (or more) HIV-infected persons for each case of frank AIDS. For example, in the United States, between 1 and 1.5 million persons are thought to be infected, and therefore susceptible to HIV-associated health problems.

AIDS and ARC are costly diseases in human and financial terms. Due to its modes of transmission (predominantly sexual), approximately 90 per cent of cases in developed and developing countries are between 20 and 49 years of age. The particular impact on younger persons is reflected in New York City (Manhattan) and San Francisco, where AIDS has become the most important cause of premature mortality (years of expected life lost) among single men 25 to 44 years old. Thus, the loss of human potential must be added to the extraordinary financial burden of an incurable disease. In the United States, the average in-hospital treatment of each AIDS patient has been estimated to cost US $40,000. In developing countries, AIDS patient care depletes the already limited health care resources. Finally, the lack of any recognised effective treatment for HIV-associated immuno-suppression limits medical care to treatment of secondary effects (infections, cancers) and alleviation of pain.

The person-to-person transmission of HIV is dominated by the role of the apparently healthy yet infected person ("carrier"), who is clearly capable of transmitting the virus, and of whom there may be, as mentioned above, 50 to 100 or more for each recognised AIDS case. Regardless of the area of the world studied, the modes of HIV
In most countries today, all blood donations are routinely tested for the HIV virus.

Transmission are fundamentally the same: (1) sexual contact with an infected person; (2) exposure to contaminated blood and blood products; and (3) from infected mother to child before, during, or shortly after birth.

Two “classic” epidemiological patterns have been recognised in the developed and developing world. In the developed world, transmission is currently most important among male homosexuals and bisexuals and intravenous drug users. Thanks to screening programmes and other measures, blood transfusions and clotting factors used in the treatment of haemophilia have virtually ceased to be a mode for HIV transmission in these areas. In parts of the developing world (such as Africa and the Caribbean), heterosexual transmission dominates the epidemiological scene. Persons receiving injections or other treatment with contaminated needles and other skin-piercing instruments, and infants born to infected mothers and recipients of untested blood are also at risk of infection.

Throughout the world, sexual contact is of primary importance in HIV transmission. This mode of transmission creates extraordinary problems for control efforts as sexually transmitted diseases have demonstrated an ability to spread rapidly and efficiently within countries as well as internationally. Sexuality and related issues are generally difficult to discuss openly due to complex social and religious factors. Nevertheless, in the absence of a vaccine, prevention of sexual transmission depends upon educational strategies which will require a strong focus and a creative approach to be successful.

Several areas of the world are now experiencing substantial endemic or epidemic HIV-associated disease, particularly North America, Europe, South America, Africa and Australia. With the exception of North America, Europe and Australia, which together reported 29,682 AIDS cases as of 9 October 1986 (86 per cent from the United States), the numbers of reported cases do not reflect the actual AIDS situation. For example, while only 15 African countries have officially reported a total of 1,008 AIDS cases, the AIDS incidence in several cities of central Africa is known to equal or exceed incidence rates in New York and San Francisco.

The AIDS situation in Africa illustrates the scope and dramatic nature of the current HIV pandemic. Studies
from several countries have documented a two to 20 per cent rate of HIV infection among healthy adults in the general population. In one African city, one in 500 (0.2 per cent) healthy mothers were HIV-seropositive in 1970. In 1984, sero-prevalence in a sample of women aged 20 to 39 from the same city was eight per cent—a 40-fold increase compared with the early 1970s. The consequences of this recent dramatic increase in HIV infections in central African countries include a substantial number of AIDS cases, an increasing number of children infected at birth by HIV, and complex interactions between HIV infections and endemic diseases of public health importance (such as tuberculosis).

In addition to evidence that the HIV problem has been increasing in those areas (presumably affected since the mid-to-late 1970s) the geographic extent of HIV infection in Africa is increasing. For example, sero-epidemiological studies among prostitutes in an East African city suggest that HIV was introduced into that population in the early 1980s. The high percentage of these prostitutes infected by 1985, combined with the now measurable sero-prevalence among healthy mothers in the same area and the virtual absence of recognised AIDS cases in that country until very recently (1985), illustrates that viral penetration into the community will be substantial by the time the first clinical AIDS cases are recognised. The recent report that 20 out of 289 prostitutes (seven per cent) in a West African country were HIV sero-positive is also of concern, although the extent of viral dissemination in West, East and Southern Africa is currently unknown.

Despite difficulties in generalising about an entire continent, an estimated one to two million or more persons may be infected with HIV in Africa. If one million persons are assumed to be infected and the most conservative rate of annual progression to clinical AIDS is assumed, (one per cent per year), a minimum of 10,000 AIDS cases annually may be occurring in Africa.

The world can be divided into three areas, according to their current HIV problem. The first group includes the developed countries which have been dealing with AIDS during the past several years. These countries recognise the public health importance of HIV infections and command sufficient resources to address many aspects of this problem. The second group of countries includes those that are apparently free, or nearly free, of HIV infection. These include both developed and developing countries, who currently have the enviable opportunity to take rational steps to protect themselves against the HIV pandemic. Some of these countries have the resources needed to undertake surveillance activities, yet others do not. Finally, in the third group are the many countries in the developing world which currently face an AIDS crisis. As already mentioned, some of these countries are characterised epidemiologically by heterosexual transmission, transmission by non-sterile needles, syringes and other skin-piercing equipment, perinatal transmission and spread through uncontrolled and unscreened blood transfusions. These countries must confront a complex HIV problem superimposed upon the already severe public health problems of the developing world, such as malnutrition, diarrhoeal disease, measles and malaria.

The alternative to concerted public health action to control AIDS is the unchecked spread of HIV infection throughout the world, ultimately reaching all segments of the population. The particular biological and epidemiological features of this infection require that the HIV pandemic be seen as a unique public health problem, and not just as another of many communicable disease problems facing the world today. Uninfected populations must be protected, as HIV infection in itself is an adverse health outcome of profound personal and public health importance. The apparently healthy infected person is not only at substantial risk of severe illness at a later date, but creates a public health risk because of the ability to infect others. Public health control of HIV cannot wait for the possible development of effective antivirals and vaccines. The solution to pandemic health problems calls urgently for international cooperation and global coordination.

Ensuring the safety of blood and blood products

The AIDS epidemic has resulted largely from sexual spread of HIV; transmission by blood transfusion or blood products has played a relatively minor role. Nevertheless, a great deal of public concern has been expressed about the safety of blood and blood products. Fortunately, effective control measures can reduce markedly the risk of transmitting AIDS by this route. Such measures must be considered in the larger context of national activities towards AIDS prevention.

As a result of several meetings organized by WHO, a series of recommendations have been formulated, a summary of which is given here.

- The public should be clearly informed that blood donation itself does not incur any risk whatsoever of infecting donors with the AIDS virus.
- Donor education and selection programmes are guaranteed to eliminate potentially infectious units of blood and plasma from being collected.
- Donors should be made aware in advance of their donation that their blood will be tested for the presence of serological markers of virus infection.
- Blood for transfusion and preparation or components should be tested for antibodies to HIV when the risk of transmitting the virus is significant, and when the benefits of such testing outweigh other important factors in providing blood.
- Blood from which plasma derivatives are manufactured should be shown to be free of serological markers of HIV in areas where the virus is prevalent. Specific exceptions might be considered appropriate by national control authorities based on therapeutic benefit and safety of the product.
- Countries which import blood products should consider, wherever feasible, reviewing manufacturing protocols so as to assess the acceptability of the products, taking into consideration these conclusions and recommendations.
- WHO should provide reference materials and sera for use in evaluating and standardising laboratory tests.
- WHO should attempt to establish uniform scientific criteria for heat inactivation, chemical treatment and serological testing of blood products regarding AIDS.
- WHO should revise its requirements to take new manufacturing and screening procedures into account.

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