Coolfont Report: a PHS Plan for Prevention and Control of AIDS and the AIDS Virus

Foreword

In 1985, the Public Health Service's Executive Task Force on AIDS published a comprehensive plan that included a set of objectives to control and prevent the spread of acquired immune deficiency syndrome by the year 2000 (1). *In the year since the plan was developed, considerable progress has been made. Our knowledge base has expanded many fold during 5 cumulative years of experience with AIDS and the AIDS virus. New information permits tentative long-range demographic projections, a better understanding of pathogenesis, a refined approach to research and development of vaccines and therapeutic agents, a refocus of prevention and control efforts, and the incorporation of patient care issues.*

The Public Health Service (PHS) convened a meeting at the Coolfont Conference Center in Berkeley Springs, WV, June 4–6, 1986. Eighty-five experts in various aspects of AIDS, including clinicians, epidemiologists, public health policy makers, and basic research scientists were invited to review and modify the plan according to current information, needs, and demographic projections through 1991. The following plan is the result of that meeting; it represents a renewed commitment by the Public Health Service to prevent and control AIDS infection and its sequelae.

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Purpose

This document provides a framework for the steps that must be taken in five broad areas—pathogenesis and clinical manifestations, therapeutics, vaccines, public health control measures, and patient care and health care needs—to achieve prevention and control of AIDS. The current plan is based on estimated changes in the demographics of AIDS through 1991. It calls for concerted action by Federal agencies, State and local health departments, professional organizations, and volunteer groups.

Goals

The following goals were first published in the 1985 plan and remain valid for guiding the continuing national effort.

- By 1987, reduce the transmission of the HTLV-III/LAV infection.
- By 1990, reduce the increase in the incidence of AIDS.
- By 2000, eliminate transmission of HTLV-III/LAV infection with a decline in the incidence of AIDS thereafter.

Background

Five years have elapsed since the initial report of *Pneumocystis carinii* pneumonia from Los Angeles marked the recognition of what has become known as AIDS. By 1984, a human retrovirus, HTLV-III/LAV (human T-cell lymphotropic virus type III/lymphadenopathy-associated virus) had been determined to be the etiologic agent of AIDS. (The International Committee on the Taxonomy of Viruses proposed the name "human immunodeficiency virus" for these viruses (2).) By early 1985, serologic tests for antibody to the virus were licensed and widely available.

In retrospect, when AIDS was initially reported in June 1981, some 5 years already had elapsed since the introduction of HTLV-III/LAV into the United States, and 3 years had elapsed since the first clinical cases had occurred. AIDS cases have been reported from all 50 States, the District of Columbia, and 4 Territories. Cases have been reported from more than 100 foreign countries.

The rapid development and implementation of sensitive and specific assays for HTLV-III/LAV antibodies have permitted screening of donated blood and plasma, and the research use of these

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and other assays has elucidated the modes of transmission, the natural history of infection, and a better understanding of the clinical manifestations of HTLV-III/LAV infections.

The predominant defect in AIDS is a profound and, so far, irreversible immune dysfunction that results when HTLV-III/LAV preferentially infects the helper-inducer subset of T-lymphocytes. Although the virus can also infect other cells of the immune system, as well as cells of the central nervous system, it is the infection of these T-lymphocytes that ultimately leads to a breakdown in the ability of an infected individual to mount an immune response. In the past 5 years, more effective therapies for some of the opportunistic infections that accompany AIDS have been found, but no cure for AIDS is yet available.

Studies of the molecular biology of HTLV-III/LAV have revealed that a copy of the viral genetic material becomes an integral and permanent component of the DNA of an infected individual. As a result, such an individual is likely to be a carrier of the virus for the rest of his or her life and, for purposes of public health control, is assumed to be capable of transmitting the virus to others.

The HTLV-III/LAV genome has been completely sequenced and the functions of several of its genes are known. Considerable differences in some genes have been found among various isolates. In addition, related viruses have been identified in man and nonhuman primates. These related viruses cause a range of different diseases. Studies in animals indicate the feasibility of vaccination against retroviruses, and one veterinary vaccine is available for the prevention of feline leukemia virus. Although some promising approaches are under way, as yet no effective vaccine for AIDS exists.

HTLV-III/LAV is transmitted by sexual, parenteral, and perinatal contact with the virus. Although this infection has been most often recognized in homosexual men and intravenous (IV) drug abusers, it is clear that this virus does not discriminate by sex, age, race, ethnic group, or sexual orientation. Behaviors which are high risk for the acquisition of HTLV-III/LAV infection include sexual contact or sharing of drug injection equipment with an infected person. Studies now clearly demonstrate that AIDS is not spread by casual contact, such as sneezing, coughing, or sharing meals with an AIDS patient.

There were 21,517 cases of AIDS reported in the United States as of June 1986. Blacks and Hispanics represent 39 percent of total cases. Women who report no history of IV drug abuse represent half of the 1,400 cases in women. Approximately 304 cases of AIDS occurred in infants and children under age 13. Between 2 and 3 percent of the cases have occurred in transfusion recipients or hemophiliacs.

Projections

The following projections, including those in the table, are based on the Centers for Disease Control (CDC) surveillance data and epidemiologic studies of populations at high risk to infection with the virus.

- Twenty to 30 percent of the estimated 1 to 1.5 million Americans infected with HTLV-III/LAV as of June 1986 are projected to develop AIDS by the end of 1991. The latency period between infection and overt AIDS averages 4 or more years in adults; therefore, most persons who will develop AIDS between 1986 and 1991 will be those who are already infected with HTLV-III/LAV.
- Based on an empirical model that uses reported cases of AIDS, by the end of 1991, the cumulative cases of AIDS in the U.S. meeting the CDC surveillance definition will total more than 270,000. During 1991 alone, more than 145,000 cases of AIDS will require medical care and more than 54,000 AIDS patients are predicted to die, bringing the cumulative number of deaths due to AIDS to more than 179,000.
- The empirical model may underestimate by at least 20 percent the serious morbidity and mortality attributable to AIDS, because of underreporting or underascertainment of cases.

Projected cases of AIDS,[1] United States

Category	1986	1991	1991 range
Cases diagnosed			
Cumulative cases at start of year	19,000	196,000	155,000 to 219,000
Diagnosed during year	16,000	74,000	46,000 to 92,000
Cumulative cases at end of year	35,000	270,000	201,000 to 311,000
Alive at start of year	10,000	71,000	50,000 to 83,000
Alive at any time during year	26,000	145,000	96,000 to 174,000
Deaths			
Cumulative deaths at start of year	9,000	125,000	105,000 to 137,000
Deaths during year	9,000	54,000	36,000 to 64,000
Cumulative deaths at end of year	18,000	179,000	141,000 to 201,000
Infections			
Persons with HTLV-III/LAV infection	1 million-1.5 million (estimate)	...	

[1]These numbers refer only to those cases that meet the CDC definition for AIDS (see Morbidity and Mortality Weekly Report 34:373-375, June 28, 1985) and do not include other manifestations of infection, such as AIDS-related complex and lymphadenopathy syndrome.

• In 1985, 9,000 cases of AIDS were diagnosed in the United States and reported to the Centers for Disease Control. The empirical model predicts that cases will continue to increase through 1991, that there will be nearly 16,000 cases reported in 1986, and that more than 74,000 cases are projected for 1991. The estimates for 1991 range from 46,000 to 90,000.

• More than 70 percent of the cases will be diagnosed among homosexual or bisexual men, and 25 percent of the cases will occur among IV drug abusers with some overlap to continue between the groups. Because the periods between infection and disease are long and variable, cases will continue to be reported among transfusion recipients and persons with hemophilia.

• Additional cases in heterosexual men and women are projected; the 1,100 (7 percent of the total) for 1986 will increase to nearly 7,000 (more than 9 percent) by 1991. This group includes patients who reported heterosexual contact with an infected person or someone in a risk group. It also includes patients in groups in which epidemiologic studies suggest heterosexual transmission as the major risk factor. By 1991, more than 3,000 cases will have been diagnosed in infants and children.

• Through 1985, fewer than 60 percent of cases were diagnosed in persons outside New York City and San Francisco, but by 1991 more than 80 percent of cases are predicted to be reported from other localities.

• Homosexual-bisexual men and men and women who use drugs of abuse intravenously will continue to be the populations at highest risk for HTLV-III/LAV infection during the next 5 years. Using estimates published by Kinsey (*3*), more than 2.5 million (4 percent) of U.S. men between 16 and 55 years of age are exclusively homosexual throughout their lives; an estimated 5–10 million more will have some homosexual contact. An estimated 750,000 Americans inject heroin or other drugs intravenously at least once a week; a similar number inject drugs less often.

• The prevalence of HTLV-III/LAV seropositivity among homosexual men and IV drug users parallels the frequency of AIDS in various cities. In 1984–85, 20 to 50 percent of homosexual men who participated in research studies had evidence of HTLV-III/LAV infection. Similarly, seroprevalence estimates among IV drug abusers ranged from 10 percent to more than 50 percent in various U.S. cities. By extrapolating all available data, we estimate that there are approximately 1 to 1.5 million infected persons in those groups at present. Thus estimates of a 20 to 30 percent progression to AIDS by 1991 in this group are consistent with the total number of AIDS cases predicted by the empirical model.

• Uninfected homosexual men have continued to acquire HTLV-III/LAV infections during the past year, but at a lower rate than would be predicted from the increases in previous years and from the increase in the number of potentially infectious persons. This observation is consistent with changes reported in sexual behavior and declines in other sexually transmitted infections in homosexual men. Nonetheless, due to the large present and future populations at risk, hundreds of thousands

of additional homosexual men, IV drug abusers, and others may become infected during the next 5 years.

- Because of heat and chemical treatment of clotting factor concentrates, donor deferral, and serologic screening of donated blood and plasma, only a very small number of additional infections are likely to occur through blood and plasma transfusions.
- Current information is insufficient to predict the future incidence of HTLV-III/LAV infection in heterosexual populations, but increases in heterosexual transmission are likely. Those at highest risk will be heterosexual sexual partners of infected persons and those who have sexual contact with past or present IV drug abusers, bisexual men, prostitutes, or others at increased risk for HTLV-III/LAV infection. As is true for homosexual men, sexual contact with multiple partners will increase one's risk for HTLV-III/LAV infection.
- Additional increases in HTLV-III/LAV infection in infants are expected as more women in childbearing years become infected.

The following five sections summarize the deliberations and recommendations made by the work groups at the Coolfont meeting.

Pathogenesis and Clinical Manifestations

Infection with HTLV-III/LAV results in a broad range of clinical manifestations including an acute retroviral syndrome, asymptomatic disease, chronic lymphadenopathy, and serious diseases including Kaposi's sarcoma and other malignant neoplasms, fatal opportunistic infections, and neurological and psychiatric disorders.

The factors that determine the expression and progression of disease in an individual are largely unknown. Techniques are available to diagnose and treat many of these opportunistic diseases, although they often recur. However, once Kaposi's sarcoma or certain opportunistic infections occur, an ultimately fatal outcome for the patient has been the rule.

- Clinical and epidemiologic studies need to be conducted to

— Clarify the natural history of infection, including the role which may be played by exogenous or endogenous factors in determining which clinical manifestations occur, and

— Continue to expand the spectrum of clinical manifestations.

- Basic scientific studies on the virology and immunopathogenesis of HTLV-III/LAV need to be expanded, especially to

— Assess target cell susceptibility;
— Identify viral and host cell determinants of transmissibility and pathogenicity including portals of viral entry, mechanisms of cytopathic effects, and dysfunction;
— Further elucidate mechanisms of viral latency and activation;
— Identify and assess direct and indirect immunopathogenic mechanisms;
— Further delineate the pathogenesis of neurologic and psychiatric abnormalities; and
— Ascertain more fully the functions of viral gene products and determine the meaning and mechanisms of genetic heterogeneity.

More suitable animal models for HTLV-III/LAV infection need to be developed to allow more comprehensive understanding of pathogenesis and rapid evaluation of treatment and prophylaxis. Dedicated efforts must be made to maximize efficiency of use of limited animal resources.

Improved methodologies are needed to detect infected and infectious individuals and to identify and quantitate virus, viral antigen, and viral antibody.

Therapeutics

No drug with proven clinical efficacy for AIDS is currently known. Both antiviral agents and immunomodulators are being developed, and several drugs are under clinical investigation at present. The ability of an agent to reverse the disease process or halt its progression may vary depending upon the stage of infection. Research is now in progress to develop new methods to inhibit viral replication and correct the immune deficiencies. A safe and effective antiviral agent is not likely to be in general use for the next several years. Experimental products are also under study for treatment of opportunistic infections and neoplasms associated with HTLV-III/LAV infection.

The following points should be considered in

order to develop drugs for the treatment of AIDS in the most expeditious manner:

- Further expansion of the multiinstitutional, multidisciplinary approach to identify and develop agents for the treatment and prevention of HTLV-III/LAV infection and associated diseases, including central nervous system disease, is necessary. Part of this effort must be the establishment of a large capacity screening program to measure the antiviral and immunomodulator activity and toxic effects of newly identified natural and synthetic compounds.
- A system for classifying HTLV-III/LAV associated disease manifestations which is useful in the design, implementation, and analyses of therapeutic trials must be developed. Standard clinical criteria for the measurement of efficacy and toxicity must be formulated to facilitate the performance of well organized multicenter clinical trials.
- The most efficient design of clinical trials of candidate antiviral agents will require the use of placebo controls. Once an agent has been shown to be safe and efficacious in a clinical trial, this agent can generally be substituted for the placebo control in subsequent clinical trials and can be used as the standard against which other agents are compared.
- New therapeutic approaches must be developed to control or eliminate latent virus and to specifically direct antiviral compounds to the appropriate target tissues. Combination strategies to control viral replication and restore the immune system must be developed and evaluated.
- Since antiviral drugs currently under development are likely to repress rather than eliminate the AIDS virus infection, long-term therapy is expected and with it the emergence of drug-resistant strains.
- New and existing strategies in the diagnosis, treatment, and prophylaxis of the opportunistic infections and neoplasms associated with AIDS all need to be developed, tested, and improved.

Vaccines

A number of vaccine candidates for human beings are currently under development, and limited clinical testing for some could begin within 2 years. Field trials to demonstrate efficacy may require additional years. Vaccines are not anticipated to be useful in individuals who are already infected. A vaccine for general use is not anticipated before the next decade, and its use would not affect the number of persons infected by that time.

'In the absence of a vaccine and therapy, prevention and control of HTLV-III/LAV infection depends largely upon effective approaches to decrease sexual transmission, transmission among IV drug users, and perinatal transmission from infected mothers.'

The following steps need to be taken:

- Vaccines employing recombinant DNA derived antigens, virus subunits, killed viruses, synthetic peptides, live recombinant or attenuated viruses, and antiidiotypes will need to be evaluated as potential candidates for human trials.
- Vaccination methods will need to be devised to induce immunity to antigenically distinct strains of HTLV-III/LAV.
- Reliable *in vitro* and *in vivo* systems need to be developed for the evaluation of vaccine immunogenicity safety and efficacy before commencing human trials.
- A program for clinical and field evaluation of vaccine(s) needs to be established, including resolution of difficult aspects of design such as identification of target populations and the definition of parameters of vaccine efficacy.
- Protocols need to be developed for the *in vitro* and *in vivo* evaluation of anti-HTLV-III/LAV immunoglobulin to explore its value in passive immunization.

Public Health Control Measures

In the absence of a vaccine and therapy, prevention and control of HTLV-III/LAV infection depends largely upon effective approaches to decrease sexual transmission, transmission among IV drug users, and perinatal transmission from infected mothers. A strategy to control and prevent AIDS should involve voluntary counseling and testing for persons at increased risk of HTLV-III/LAV infection and imparting to infected patients those Public Health Service recom-

mendations concerning personal behaviors that must be observed if spread of the virus is to be halted. Throughout this section, serological testing is intended to be voluntary, conducted with confidentiality, and accompanied by appropriate pretest and post-test counseling.

Public health activities directed toward the control and prevention of AIDS have required significant funding and staffing at national, State, and local levels. The projected increases in AIDS and HTLV-III/LAV infection over the next 5 years will pose substantial continuing demands for resources for these efforts.

The recommendations of the conference participants concerning public health measures focused on five areas.

1. Information base.

- Information is needed to better determine the size of the population at greatest risk in the United States, particularly the numbers of homosexual men, bisexual men, IV drug abusers, and heterosexuals who have multiple partners.
- Better information is needed on the number of persons infected with HTLV-III/LAV. Extensive and repeated seroepidemiologic surveys are needed to determine the incidence and prevalence of infection by age, race, ethnicity, sex, geographic area, and sexual preference. States should be encouraged to obtain and report data on incidence and prevalence to CDC for publication.
- The Public Health Service should encourage and assist in the evaluation and comparison of all interventions for prevention and control of AIDS and HTLV-III/LAV infection.
- PHS should continue to support key epidemiologic studies.
- The United States should continue to play a role in understanding and assisting efforts to control the disease worldwide, particularly in areas with seemingly different epidemiologic patterns.

2. Information and education. National information and education campaigns on AIDS and HTLV-III/LAV infection should be targeted to individuals and groups whose behavior places them at high risk for AIDS, other sexually active adults, adolescents, preadolescents, and health care providers. A major target of mass information-education programs is the currently uninfected population, to assure that those persons know how to protect themselves. An additional purpose is to persuade infected persons to take appropriate steps to safeguard their own health and to avoid infecting others.

- PHS should explore the advantages of using paid radio, TV, and printed media advertising as well as public service announcements to inform the public on AIDS and HTLV-III/LAV infection.
- PHS, State and local health departments, State and local boards of education, colleges, universities, and other organizations should support and encourage comprehensive health education that includes information about AIDS and HTLV-III/LAV infection.
- With the assistance of appropriate organizations, programs should be implemented to provide culturally sensitive, meaningful information and education to blacks and Hispanics, including homosexuals, IV drug abusers, blood donors, women both at risk themselves and also at risk for transmitting infection perinatally, and to other segments of the public.
- Health care providers need current information and training on the diagnosis, psychosocial counseling, and management of HTLV-III/LAV infected persons.

3. Prevention of IV drug abuse transmission. IV drug abusers serve as the major reservoir for transmission of infection to heterosexual adults and their infants, as well as among themselves. As a group, they are not well organized, often poorly educated, and tend to have less interaction with the health care delivery system than other groups who participate in high-risk behaviors. Efforts to change drug abuse behavior must proceed with the understanding that addictive behavior is not often changed without specific drug treatment.

- A systematically increased capacity for treating IV drug abusers is needed. Until adequate capacity is available, persons in need of treatment should be prioritized. Decisions may vary by locality, but highest priority should be given to those presently on waiting lists for treatment.
- All treatment and prevention approaches should include information and counseling on sexual and perinatal transmission of HTLV-III/LAV, availability of family planning services, and availability of voluntary serological testing for HTLV-III/LAV.
- Until treatment capacity is adequate for persons who continue to abuse IV drugs, studies are needed to evaluate the efficacy and feasibility of promoting safer use of drug paraphernalia (for example, increased availability of sterile needles or

"works") and education regarding use of sterile needles and sharing of needles.

4. Prevention of sexual transmission. Sexual contact will remain the primary mode of HTLV-III/LAV infection for the foreseeable future, with greater increase in the proportion of heterosexual transmission over the next 5 years.

A central goal of local disease control programs should be to reach the greatest number of HTLV-III/LAV infected persons with testing and counseling (provision of pretest and post-test information, including psychological support) about their infections and methods to reduce the likelihood of transmission to others, in order to change high-risk sexual behaviors. At present, only a small proportion of the already infected population has been reached.

Several methods may help achieve this goal, although they may have differing efficacies in various settings and populations. These include encouragement of voluntary serological screening, self referral of sexual and drug abuse contacts, notification and counseling of contacts by health authorities, and targeted educational programs.

- Serological testing of persons whose behavior places them at risk should be encouraged and made widely available. In all communities, appropriate medical care encompasses offering counseling and testing to all persons at risk, including persons with a sexually transmitted disease, IV drug abusers, and persons seen in private practice who engage in high-risk behaviors. (Anonymous testing should be available as an option.)
- Self-referral of an infected person's sexual and needle-sharing contacts should be encouraged. In some areas or populations, additional contact notification activities may be offered to infected persons by the health agency.
- Research is needed on the efficacy of counseling or knowledge of personal serological status or both in modifying sexual and needle-sharing behavior to reduce or eliminate the risk of transmission.
- For persons who know that they are infected with HTLV-III/LAV yet continue to practice high-risk sexual or needle-sharing activities, temporary involuntary isolation should be considered an option only in rare instances and after due process. Enforced isolation is not a practical way to minimize spread of the infection, since infected persons probably remain infectious for life. Education, counseling, and social services—including drug treatment—are the main interventions for dealing with this problem and are appropriately applied to recalcitrant infected persons and their potential consenting partners. Uninfected persons must avoid behavior which would permit infection from persons who know or do not know they are infected.

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5. Prevention of transmissibility by blood and blood products. The risk of transmission of HTLV-III/LAV by transfusion of blood and blood products is extremely low, due to deferral of high-risk donors, serological screening of donated blood and plasma, and the heat and chemical treatment of clotting factor concentrates. Nonetheless, some additional measures are appropriate to further reduce this low risk.

- Increase the effectiveness of deferral by all persons at increased risk of HTLV-III/LAV infection by:

—Collecting demographic and other data from donors found to have confirmed HTLV-III antibody. This will require some type of case reporting and subsequent interviews, but it is essential to the continued evolution of the high-risk donor deferral strategy;

—Improving communications to potential donors about self-deferral, taking into consideration their language skills and literacy;

—Exploring the usefulness of providing means at the time of donation for blood donors, who do not self-exclude but who have remaining doubts about their suitability, to designate that their donated unit not be used for transfusion;

—Implementing the use of a signed donor consent form in all blood banks that clearly indicates the absence of specific risk factors for transmission of infections;

- Continue to require that blood and plasma establishments maintain deferral lists of donors who have repeatedly reactive ELISA tests.

• Continue to encourage development and use of more sensitive serologic tests for HTLV-III/LAV infection.

• Recommend that current recommendations for HTLV-III antibody testing for donors of organs, tissues, cells, and semen be made mandatory.

• Encourage increased activities to eliminate unnecessary transfusions.

Patient Care and Health Care Needs

Over the period 1986 to 1991, AIDS and associated conditions will place an increasing burden on the health care delivery system through an increased number of patients and increased aggregate costs of care. The burden will be shared by a larger number of communities, including some which will have a less complete capacity for response. There will be increasing fragmentation and less health care control of services provided if more nonmedical, less traditional, and some unethical providers become involved.

PHS estimates that the direct health care costs of persons with AIDS will be between $8 and $16 billion in 1991. (The $8 billion figure is based on the projection of 71,000 AIDS patients alive in 1991 and 74,000 new cases by then. An additional 29,000 cases was added to account for the 20 percent underreporting or underascertainment of cases. The cost for treating a patient with AIDS used in the calculation was $46,000. For the higher range, the $8 billion figure was doubled.) These sums represents 1.2 to 2.4 percent of the expected total U.S. personal health care expenditures in 1991 of about $650 billion. Because people with AIDS are concentrated in certain urban centers, however, these costs will be disproportionately borne.

These estimates may be conservative by 10 to 50 percent because of the increased need for care for the large population of patients with the other conditions associated with HTLV-III/LAV infection and the significant nonmedical care costs necessary for management of these illnesses. Development of community-based health and social services support systems can reduce costs and enhance care during this 5-year period.

To improve care for AIDS patients, all sectors of the health care delivery system should work together to

• Develop a coordinated Federal, State, and local response to manage the health services and health financing crisis posed by the escalating AIDS epidemic. This response must reflect the pluralistic character of the American health care system and must involve the coordinated participation of the public, private, and voluntary sectors, as well as ambulatory, in-hospital, and long-term care providers;

• Explore the feasibility and need for convening a national, blue-ribbon commission representing the necessary constituencies to canvass needs and resources available and to make recommendations regarding how each sector of our society can help to fill financing and resource needs;

• Emphasize the needs of institutional and community-based providers for training, continuing education, and psychosocial support;

• Upon request, assist State and local governments and community-based organizations to assess, develop, and implement comprehensive service delivery systems of care for AIDS patients in a cost-effective manner;

• Develop organized consortia of service delivery systems responsive to the care of AIDS patients; such consortia should include all the necessary components of care (that is, ambulatory, hospital, mental health, and dental health services, counseling, home health care, and hospice care.)

• Explore efforts to set up regionalized consortia of services for AIDS patients;

• Utilize studies of the special health services needs and barriers to prevention of HTLV-III/LAV infection in blacks and Hispanics, and best methods of information dissemination to foster inclusion of culturally sensitive service delivery for children with AIDS, IV drugs abusers, hemophiliacs, and minorities in all appropriate metropolitan areas;

• Initiate demonstrations of the appropriate care needed at different stages of the illness, costs of services, and most cost effective provisions of needed services, including Model Medical Waiver programs; and

• Support health services research on AIDS that emphasizes cost of services for different risk groups, stages of illness, and treatment modalities and assesses potential improvement of methods and increased cost-effectiveness of care.

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