A THREE-YEAR FORECAST OF HOSPITAL ADMISSION COSTS OF AIDS PATIENTS IN OKLAHOMA

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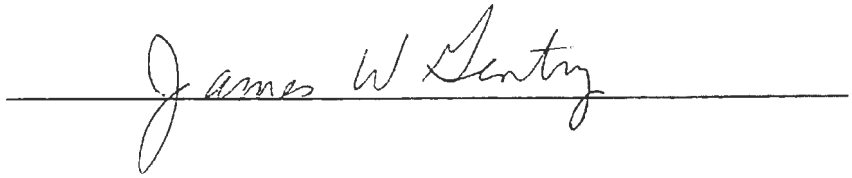
Scope and Method of Study: The sudden onset of the acquired immunodeficiency syndrome (AIDS) in Oklahoma in January of 1983 has created some very serious problems for health care providers. The high costs related to the medical management of AIDS patients have resulted in significant financial burdens for a number of Oklahoma hospitals. In order to formulate a strategic plan for coping with future hospital admission costs associated with the increasing number of AIDS victims, a forecast relating the extent of the potential problem is necessary. The objective of this study is to provide that forecast by combining historical hospital admission costs for AIDS patients in Oklahoma with a computer forecast of expected new cases over the next three years. Eight hospitals, which managed 87 percent of the reported AIDS cases, provided admission-cost figures for 71 percent of the cumulative Oklahoma morbidity. The Interactive Financial Planning System (IFPS) was employed to derive anticipated case totals for each of the three calendar years.

Findings and Conclusions: Although the average Oklahoma AIDS patient survives only four months after diagnosis, the hospital admission charges total approximately $25,000 per patient. This is based on observed figures, which indicate an average of 35 hospital days at $708 per patient per day. The predictions for new AIDS diagnoses for 1986, 1987, and 1988 reached 44, 69, and 100 respectively. In combining these numbers with average cost figures, charges for hospital admissions are expected to reach $1.1 million in 1986, $1.7 million in 1987, and $2.5 million in 1988. This reflects a $5.3 million total for the next three years, in terms of hospital admissions only, for medically managing AIDS patients.

ADVISER'S APPROVAL 

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COSTS OF AIDS PATIENTS IN OKLAHOMA

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CHAPTER I

INTRODUCTION

General Statement

The acquired immunodeficiency syndrome (AIDS), in a very short period of time, has attained a position of national notoriety. The sudden appearance of this new debilitating disease with ultimately fatal consequences has created consternation among medical scientists and panic within the general population. Although a vast amount of knowledge has been gathered concerning AIDS since the identification of this condition, much is still unknown and only time will permit a full understanding. And, as is true in most areas of medicine and disease control, clear-cut definitive answers do not exist for every individual situation or contingency. Unfortunately, much media attention has focused on various inflammatory, yet extremely unlikely, modes of transmission and thus contributed to mass confusion.

Consequences

First recognized in the United States in 1981, AIDS had been diagnosed in approximately 16,000 individuals by the end of calendar year 1985. The seriousness of this syndrome is obvious in the overall mortality rate of 51 percent. Appendix A illustrates this mortality and the demographic breakdown of reported AIDS cases in the United States. This is compounded in significance by the fact that nationally the

survival period from time of diagnosis has a mean of 18 months. In reviewing cases diagnosed prior to 1983, the mortality reaches 77 percent in those patients whose final disposition was reported to the Center for Disease Control (CDC, 1985b). Many of those reported cases eluded epidemiological evaluation after the definitive diagnosis, and consequently the actual death rate is believed to be even higher.

AIDS represents only the final stages of infection by the human T-cell lymphotropic virus type III (HTLV-III) or the lymphadenopathy-associated virus (LAV) (Curran, 1985). Both names refer to the same entity. This virus actually invades and substantially weakens or even destroys the cells which form an integral segment of the body's immune system, thus inhibiting or eliminating the normal defenses. As a result, commonly occurring, and usually insignificant, infective agents become invasive to the compromised host and subsequently create life-threatening situations. These disease-producing organisms are referred to as opportunistic infections, owing to the fact that they are able to exploit the host organism only after the natural immune system is depressed.

Type of Virus

The HTLV-III/LAV organism is actually a retrovirus, a classification of virus that was unknown as few as 10 years ago (Gross, 1983). Scientists have only recently developed the technology necessary to identify the type of viral replication which determines the specific classification. Until the evolution of AIDS, retroviruses were believed to have only minor roles in the area of human disease and therefore had not attracted much attention in terms of medical management or disease control research. For retroviruses, as with most other types of viral

agents, no cure exists once they have invaded the body. Vaccines are possible but difficult due to viral mutagenicity.

Medical Management

The symptomatic conditions, serving as indicators for the HTLV-III/LAV infection, have dictated the course of medical management (Merigan, 1984; Armstrong, Gold, Dryjanski, Whimbey, Polsky, Hawkins, Brown, Bernard and Kiehn, 1985). While research is directed toward a cure for the infected and immunization for those at risk of acquiring the disease, applicable developments are still many years away. Broad spectrum treatments for AIDS victims are currently limited to experimental drugs, which range in function from T-helper cell enhancement to viral replication suppression (Hirsch and Kaplan, 1985). These drugs, approved through the Federal Drug Administration on a case-by-case basis, are very expensive and often have dangerous or unknown side effects. Considering the prognosis for the AIDS sufferer, FDA releases have not been especially difficult to obtain. However, the debilitating nature of the syndrome still presents a general barrier to productive employment for the AIDS victim, and often the expense of these particular medications and the requirement for administration in a hospital setting make their obtainment prohibitive.

The medical services most often required by AIDS victims are in response to the diagnosing and managing the episodes of opportunistic infections. These "products" of the syndrome generally occur singly or in combinations and are often severe enough to require hospitalization. Additionally, because these maladies are, or have the potential of rapidly becoming life-threatening, hospital needs include more

specialized services such as the employment of sophisticated life support equipment, constant monitoring, and even the regular use of intensive care facilities (Landesman, Ginzburg, and Weiss, 1985; Volberding, 1985). Since the opportunistic agents are so common in the environment, the AIDS patient can be subject to frequent and prolonged hospitalizations, and the resulting hospital bills can be staggering, yet largely unavoidable in the current procedural guidelines.

Historical Expenses

Due to the sudden onset of this entirely new syndrome, most private physicians were unequipped to recognize the relationship of the opportunistic infections and how to make the diagnosis of AIDS. As a result, a great majority of the diagnoses came to realization through hospital admission and an accompanying battery of extensive tests. Many times the patient, too, was unaware until a life-threatening circumstance developed and required immediate hospitalization. Those attending hospitals soon found themselves with large investments and little hope of recouping their losses.

Those expenses associated with the medical management of AIDS patients have been astronomical. Estimates of expenditures for the first 10,000 patients with AIDS reported in the United States amounted to $1.4 billion for hospital utilization (Hardy, Rauch, Echenberg, Morgan, and Curran, 1986). As the number of infected individuals continues to increase, these related costs will also rise, creating an even greater economic burden. Major controversies already flourish regarding how these expenses will be absorbed and by whom. Suggestions have included a direct national effort of major proportions to coordinate and financially

support activities in the health care system aimed at managing the AIDS epidemic (Groopman and Detsky, 1983; Shahoda, Lashley, and Firshein, 1986).

Objectives

The State of Oklahoma will not be free of these specific issues either. While the volume of AIDS cases may not be as severe as in other areas of the country, the situation does require attention as the number of patients diagnosed with AIDS is significant and expected to increase. The first reported case of AIDS occurred in Oklahoma in 1983, and subsequently, four additional cases were diagnosed in that calendar year. For 1984, the new reports equalled 12, and in 1985, diagnosed infections reached 25. Although this reflects only 42 total cases in the three-year period, the rate of increase is substantial and any available control measures have yet to prove their real value.

In order to formulate a strategic plan for coping with the potential economic impact, the forecasting of AIDS morbidity is necessary to define the magnitude of the problem. Hospitals have rapidly become cognizant of the difficulties in recovering their costs, and insurance companies are currently seeking methods of avoiding or limiting their outlays in the AIDS epidemic. Federal, state, and local governments cannot ignore this situation since health issues of this proportion will affect everyone. The greater the severity of the AIDS epidemic in Oklahoma, the greater the pressures on community organizations and state agencies to provide financial support to health care facilities and general assistance to the victims. This is more essential and yet even more problematic in light of the current generally depressed economic conditions plaguing Oklahoma.

This paper is an effort to establish, for each of the next three years, an estimate of total hospital costs associated with managing AIDS patients in Oklahoma. This estimate will be vital for hospitals facing the greater demand on their services in this epidemic. This is also an essential step for the recently formed AIDS Program within the Sexually Transmitted Disease Division of the Oklahoma State Department of Health, in order to formulate program goals and objectives, and to provide recommendations to the State Legislature in terms of legislative and supportive actions. However, in view of intensive worldwide research and the rapid accumulation of new knowledge regarding HTLV-III/LAV infections, any projection over three years would be beyond the scope of current developments.

Several factors need to be evaluated in order to arrive at a realistic forecast in this set of particular circumstances. First, a projection of the expected number of newly diagnosed cases of AIDS establishes a volume figure. Second, historical costs incurred by Oklahoma hospitals in managing past AIDS victims provide financial guides for future expectations. However, at the present time, no common denominator has been identified among infected individuals or within the opportunistic infections which would account for the inconsistencies in survival time or variation in the number and duration of required hospitalizations. And third, an inflation index for hospital costs in Oklahoma facilities is useful in adjusting costs to current dollars over the observed period of time. This should provide a clearer picture of the fiscal needs for at least short-run planning.

Although AIDS itself represents the "tip of the iceberg" in the HTLV-III/LAV infection, the hospital costs for medical management have

been paramount. Those infected with the virus, but who do not technically meet the strict epidemiological definitions of AIDS, often require medical treatment for a series of minor infections and symptomatic responses (Virginia Health Department, 1985). However, the expenses incurred in their management are significantly less than the costs associated with the specialized hospital care and sophisticated equipment required in treating the AIDS victim. Without a specific definition for other conditions related to the viral infection, reporting is ineffective and irregular. This makes an accurate accounting impossible.

The debilitation associated with AIDS forces most victims to a dependency on governmental or community support for survival, even though these resources are insufficient in their current level of operation. The state agencies will bear the brunt of administering these programs, supplemented with the financial aid of all government levels. The health care providers will also feel the severe financial crunch and must be prepared to deal with the epidemic, since the amount of any government aid will most likely be restricted. With the potential for such a large economic threat, the time for planning is now, and the first basic step is to try to gain a feel for just how great the potential problem is.

CHAPTER II

REVIEW OF AIDS

Realization of Problem

The first public indications that a significant medical emergency had arisen were reports appearing in the spring of 1981 (CDC, 1981a; Gottlieb, Schroff and Schanker, 1981). The initial writings centered around the diagnosis of pneumocystis carinii pneumonia (PCP) and candidal mucosal infections in several previously healthy homosexual males. These patients had been diagnosed in various hospitals in Los Angeles between October 1980 and May 1981, and many had already died. These reports were of particular concern since, in the United States, pneumocystic pneumonia is extremely rare except in patients with severely compromised immune systems. Of those patients tested, all showed evidence of abnormal cellular-immune function brought on by unknown causes.

In July of 1981, the Morbidity and Mortality Weekly Report (CDC, 1981b) described 26 young homosexual males who were diagnosed in California and New York City as having Kaposi's sarcoma (KS). The article also points out that this malignancy is rare in the United States with an annual estimated incidence of 0.02-0.06 cases per 100,000 persons and generally affects only elderly males of Mediterranean descent. The disease manifestations range from slowly advancing vascular nodules on the skin to extensive involvement of other organs. Of the young men referred to in this article, eight had passed away within 24 months of

diagnosis. As both PCP and KS are typically manifest in immunosuppressed individuals, scientists began searching for a link in the homosexual lifestyle that might shed light on a causative agent of this immune deficiency.

Evidence for an Infective Agent

Because of similarities in transmission patterns to that of hepatitis B, a viral entity was suspected to be the causative agent. The types of sexual activities inherent in the gay lifestyle, large numbers of sexual partners, and use of inhalant drugs such as amyl or butyl nitrates were all believed to be potential factors in disease transmission and/or progression (Marmour, Friedman-Kien, and Laubenstein, 1983; Jaffe, Hardy, Morgan and Darrow, 1985). Additional research has indicated receptive rectal intercourse as a primary mode of transmission, and risk of infection does parallel increased numbers of casual sex partners (Darrow, Jaffe, and Curran, 1983). The inhaled drugs, "popper," have been indicated as a coincidental occurrence or possibly a procarcinogen to KS (CDC, 1983).

During the last half of 1981 and early 1982, a greater number of opportunistic infections were indicated as having a specific relationship to the increasing number of diagnosed immunosuppressed patients (CDC, 1982a). By definition, these diseases take advantage of the depleted body defenses in invading the host organism and can become debilitating to the point of causing death in the host. For epidemiological purposes, the more significant of these infections have been targeted for reporting (Appendix B).

While the first incidences of this unusual condition were reported in young male homosexuals, the same apparent malady was discovered in intravenous drug abusers who shared needles with other users, in hemophiliacs, and in recipients of other blood products (Cohen, Marmour, DesJarlais, Spiral, Friedman, and Yancovitz, 1985; Eyster, Goedert, and Sarngadharen, 1985). This lent support to the theory that the infective organism was present in and capable of transmission through blood and blood products. Another group demonstrating a high incidence of the syndrome were immigrants from Haiti. This last segment was questionable since they did not offer any of the potential risk factors which were more obvious in the other named groups.

In 1982, the Center for Disease Control published a name for this recognized medical condition (CDC, 1982b). Acquired immunodeficiency syndrome (AIDS) became the widely accepted nomenclature for referring to the consequential condition of the immune suppression. In order to outline case reporting for disease surveillance, CDC defined AIDS on two basic criteria. One was the presence of a reliably diagnosed disease at least moderately indicative of cellular immune deficiency, and second, the absence of an underlying cause for the immune deficiency or reduced resistance.

The earliest reported cases of AIDS revealed significant concentrations of infection by standard metropolitan statistical areas of residence in a few coastal states of the continental U.S. (Appendix C). The SMSA's with the highest incidence of AIDS are also areas of comparatively high concentrations of homosexual males and IV drug users. In New York City and Newark, New Jersey, "shooting galleries" are popular among drug addicts. In these galleries, drug users share needles by

passing a syringe from one person to another. This practice provides a distinct opportunity for exposure to the blood of others through multiple use of potentially contaminated needles. Another breakdown in six-month periods (Appendix D) reflects the known morbidity of cases diagnosed and reported, and the corresponding death rate over time. The area morbidity and high death rates are consistent.

Another at-risk segment of the U.S. was officially recognized toward the end of 1982. This included hemophiliacs and recipients of blood transfusions. The risk to hemophiliacs for exposure to AIDS came through the treatment of their disease with concentrated clotting factors. These concentrates, particularly Factor VIII, were derived from the pooled plasma of 2,500 to 25,000 donations (Levine, 1985). Thus, an individual with hemophilia could be exposed to the plasma of a great number of often commercial donors with each treatment with Factor VIII. The fact that some AIDS patients had no identifiable risk factor other than receiving blood transfusions led the Public Health Service to recommend that persons belonging to any of the named risk categories refrain from donating blood, blood products, or other body fluids and organs (CDC, 1983a).

Another means of transmission was observed in infants born to infected parents. Those newborns were diagnosed as having AIDS by ruling out other immune dysfunctional diseases and by confirming the presence of the familiar opportunistic infections (CDC, 1982c). Few of these infected newborn survived for a period of more than a few months. The sequence of occurrences added more support to the search for an infective agent in body fluids and particularly in blood.

Identification of the Virus

In 1983, a new virus was isolated at the Pasteur Institute in Paris, France, from a patient with persistent generalized lymphadenopathy (Barre-Sinoussi, 1983). This was actually a retrovirus and was labeled the lymphadenopathy associated virus (LAV). The isolation of a similar retrovirus was reported in the United States in 1984 and was named the human T-cell lymphotropic virus (HTLV-III) (Gallo, Saladhuddin, and Popovic, 1984; Popovic, Sarngadharan, Read, and Gallo, 1984; Sarngadharan, Popovic, and Bruch, 1984), or AIDS-associated retrovirus (ARV) (Levy, Hoffman, and Kramer, 1984). These independent isolations have proven to be a single strain of retrovirus, generally referred to in the U.S. as HTLV-III/LAV or just HTLV-III. All human retroviruses have the characteristic affinity for T-lymphocytes, or T-helper cells, which are a major component of the body's immune system. The T-cells control host antibody production.

Retroviruses were first isolated and classified as a separate group in 1979 (Poiesz, Ruscetti, and Gazdar, 1980). The initial retrovirus, associated with adult T-cell leukemia, was the human T-cell lymphotropic virus (HTLV-I). Another member of this family was discovered shortly afterwards in a patient with a T-cell variation of hairy cell leukemia, and was named HTLV-II. Both of these retroviruses have been isolated from AIDS patients, although the HTLV-III is viewed as the specific causative agent.

Retroviruses are significantly different from other viruses in that they carry their genetic codes in ribonucleic acid (RNA), while the bulk of living organisms carry their genetic information in deoxyribonucleic acid (DNA). Therefore, the retrovirus groups present some very difficult

situations. The retrovirus, upon entering a cell, employs a self-contained enzyme called reverse transcriptase to translate specific RNA codes into the DNA of the host cell. Having then become part of the host cell, the viral code may lie dormant for periods up to a great number of years, and in fact, the latency period of viral infection to development of AIDS can be 1 to 7 years and possibly longer. Yet every time an infected cell replicates, the viral code is reproduced in the new cell. To infect other normal cells, the retrovirus information must be translated back into the RNA strands which are released to repeat the process of infecting healthy cells. The replicative actions involving reverse transcriptase have proven to be very error-prone processes. This has created a situation of numerous mutations of the virus, even within a single host organism. Over 100 isolates have been identified to date (Gallo and Wong-Staal, 1985), and as a consequence, development of a cure or even a vaccine will be extremely difficult.

When the dormant HTLV-III/LAV activates, the host cell functions as the viral code dictates. This leads to a serious inhibition of the normal operation to the extent that host cell is severely weakened or even killed. The T-helper cells become fewer in number, significantly attenuated, and die more quickly, and as a result the body's immune system is much less effective in resisting infection. Current research suggests that the invasive HTLV-III/LAV is activated when the host immune system in general has been activated (Blattner, Biggar, Weiss, Melbye, and Goedert, 1985). This would suggest that any type of disease-causing agent or other infection, by stimulating an immune response in a contaminated individual, could activate the already present virus and in effect cause the T-lymphocytes to self destruct. Therefore, repeated

infections or even additional exposures to the body fluids on one carrying the virus could stepwise depress the host immune system to the point that AIDS would have a greater likelihood of occurring.

The HTLV-III/LAV has been isolated from a number of body fluids, including blood, semen, saliva, and tears. The greatest concentrations of the virus, and consequently the greatest potential for transmission, have been found in blood and semen. The concentrations in saliva and tears make transmission from those fluids extremely unlikely, yet not impossible. This is supported by the findings that the greatest number of AIDS cases by far give histories of exposure to the blood and blood products, or semen and sperm of individuals who were already infected.

Viral Origin

Substantial evidence indicates that AIDS originated in Central Africa (Clumeck, Sonnett, and Taelman, 1984). Another investigation by Saxinger and associates (1985) examined blood samples of a 1972 study of Ugandan children and found 65 percent of apparently healthy individuals to be positive for HTLV-III/LAV. These blood samples are the oldest studied to date and prove the presence of the virus, or a very similar organism, several years prior to isolation in this country.

Additional support for this hypothesis comes from the identification of a virus very similar to HTLV-III in Old World Monkeys, initially in the Macque monkey (Miyoski, Taguchi, and Fujuhita, 1982; Guo, Wong-Staal, and Gallo, 1984). Essex and coworkers (Essex, Allan, Kanki, McLane, Malone, Kitchen, and Lee, 1985) also discussed a simian retrovirus (STLV-III) which was morphologically and biologically comparable to HTLV-III. Approximately half of the African green monkeys tested exhibited

antibodies to one or both of these retroviruses (Kanki, Kurth, and Becker, 1985). The monkey population in Central Africa has long been observed to intermingle with the human inhabitants of the region. The potential for exposure to the retrovirus in infected monkeys' body fluids could have provided the necessary mechanism for transfer to the human population, and combined with the organism's proclivity for mutation, may have resulted in the human virus observed today.

After the recognition of the viral organism as the presumptive causative agent of AIDS, the next logical step was to develop an accurate, yet inexpensive screening test to identify those individuals carrying the virus. An ideal screening test would be sensitive, specific, reproducible, inexpensive, rapid, and non-invasive. This particular virus has been grown by means of tissue cultures, but this method is cost prohibitive, requires specialized equipment, and has a long turnaround time. Additionally, only a few locations, primarily in the U.S. and France, have the capacity to carry out this procedure.

The ELISA, or enzyme-linked immunosorbent assay, provided an answer. This test procedure had already been refined to detect antibodies to HTLV-I, and therefore was easily modified to react with antibodies to HTLV-III. This serological test also meets the general criteria for an efficient screening test, and subsequently, the ELISA was licensed by the FDA for general use in March of 1985.

The ELISA results are read in terms of a ratio determined by the optical density of the test sample to a control value. Because this method is sensitive, specific, relatively inexpensive, and can be read rapidly, the ELISA was well suited for use in blood banks, plasma centers, and other facilities involved in processing blood or body

fluids. The specificity of the ELISA in this case is around 98.6 percent, while the sensitivity reaches 93.7 percent (Petricciani, 1985; Weiss, Goedert, Sarngadharan, and Bodner, 1985). Although no legitimate confirmation test exists presently, the Western Blot is another method used in tandem with the ELISA.

The Western Blot is a more costly procedure and has a longer turnaround than the ELISA. However, an advantage to this test is that specific protein bands, which typically are associated segments of the HTLV-III, can be recognized. The primary proteins identified consist of a core antigen (p24), an outer membrane protein (gp120), and transmembrane envelope proteins (gp41 and gp55) (Sarngadharan, Popovic, and Bruch, 1984). A diagram of the general retrovirus structure is illustrated in Appendix E. These proteins are recognized through a chemical separation by bands according to molecular weights in an electrophoretic procedure (Carlson, Bryant, and Hinrichs, 1985).

The potential for false positive results with the Western Blot is uncertain. Although these proteins are integral in the HTLV-III, research may also find them to be part of other biological not related to the virus in question. In fact, some false positive results have already been documented with individual reactions to the cell line used to grow the viral material and not the viral components specifically. Many false negatives have also been recorded as patients late in the throes of AIDS lose the volume of T-helper cells to such an extent that, in effect, antibodies are no longer created. Both the ELISA and the Western Blot are screening tests for antibodies to HTLV-III and are not tests for AIDS itself.

Current Trends

Understanding of the AIDS virus and realizing the consequences of infection have become more clear almost daily. The national and worldwide attention of medical and laboratory experts has resulted in more information regarding this new epidemic being available in a shorter period of time than any other research effort in history.

Current estimates reveal that one to two million people in the United States could be infected with the human T-cell lymphotropic virus. However, research has demonstrated that only 5 to 20 percent of seropositive homosexual males actually go on to develop AIDS within one to five years (CDC, 1985a). This is based on observations since the first appearance of the syndrome in this country. Therefore as time passes and more data are gathered, this percentage and associated latency period may be adjusted substantially. Some indications are that this rate of developing AIDS may already be 30 percent or greater.

The diagnosis of AIDS is quite obviously only "the tip of the iceberg" in the range of problems associated with the HTLV-III/LAV infection. The definition of AIDS offered by CDC was admittedly limited to provide an epidemiological basis for reporting the severe consequences of the viral invasion. This expanded from the initial definition consisting of the occurrence of a reliably diagnosed disease at least moderately indicative of cellular immunodeficiency, and the absence of an underlying cause for the immune deficiency or any known cause for reduced disease resistance. With the licensing of testing for HTLV-III/LAV, the CDC definition was broadened in 1985 to include, as another diagnosis requirement, a positive test for the HTLV-III/LAV antibodies (CDC, 1984).

Recently, CDC proposed and requested comment on a new system for classifying and reporting infections associated with the HTLV-III/LAV (CDC, 1986). This system would provide for four classes which describe acute responses, asymptomatic infection, persistent generalized lymphadenopathy, and other diseases. The last group is divided into a number of subgroups describing other infections resulting from the presence of the AIDS virus in the human host. This also permits a more detailed national reporting of HTLV-III/LAV occurrences, and therefore a greater realization of heretofore unidentified sequelae of this devastating virus.

Another change, suggested in early 1986, pertained to consolidating the variety of names surrounding the AIDS virus. The subcommittee of the International Committee for the Taxonomy of Viruses has recommended naming this particular virus the human immunodeficiency virus (HIV) (Coffin, Haase, and Levy, 1986). This has met with favorable response from the scientific community, and HIV is entering common parlance.

National trends consistently reflect that the groups with highest risk for infection are gay or bisexual males and IV drug users who share needles. These two categories, as illustrated in Appendix A, represent 73 and 17 percent of the total cases respectively. In Oklahoma, these two risk groups, respectively, constitute 88 and 5 percent of the total cases (Appendix F). The practice of sharing needles for intravenous drug use, which has not been shown to be as common a practice in Oklahoma as in other areas of the country, may account for the smaller percentages of cases occurring in these individuals.

The high volume of cases in the gay community does not directly translate into AIDS as being a "gay disease". As mentioned previously,

the type of contact involved may be significant in exposure to body fluids of others, as is obvious in the sharing of needles for drug injection. No individual has been demonstrated to be immune to the HTLV-III/LAV, and the potential for spread through heterosexual contact has been proved in several instances. AIDS is not spread by casual contact.

In the public health approach to interrupting the disease transmission, education is the primary weapon. Safer sex practices involving the avoidance of exposure to another's body fluids have been advertised extensively. The blood banks have requested that high-risk individuals refrain from donating blood, blood products, organs, sperm, or any other body products.

This reflects a common sense approach to preserving the integrity of the blood supply since the only available screening tests are far from perfect. The development of an effective vaccine is still several years in the future, and a cure even farther beyond. Until research successfully reaches these goals, individuals will have to be responsible for their own actions for the safety of the community in general.

CHAPTER III

METHODOLOGY

Information Gathering

A realistic estimate of hospital admission costs for AIDS patients in Oklahoma requires the combined input of several specific factors. First, historical costs must be obtained for the known cases managed within the State in order to establish a cost basis. A second need is to identify an annual inflation index, which would permit equating values for expenses incurred in different years on a common scale. And finally, a forecast of annually reported AIDS morbidity must be created. By combining these elements, a current dollar amount for expected AIDS hospital admissions can be derived for Oklahoma in the short run.

Information gathering to identify annual reported cases of AIDS and to record associated historical hospital expenses occurred primarily through researching existing records. These particular sources included both private and governmental materials. Recognizing individual patients was necessary to correlate survival times with admission charges, particularly when more than one facility had been utilized by a specific patient on separate occasions. However, due to the extremely sensitive nature of public attitudes regarding AIDS and the rights of individuals to privacy, the information received from each facility must be protected in every sense to safeguard the individual and the participating health care facility. Of eight Oklahoma hospitals contacted, only one declined

to supply the requested financial data. The institutions that did furnish the desired information provided complete financial reports on 30 AIDS victims.

The Oklahoma State Department of Health, Sexually Transmitted Disease Division retains sole responsibility for maintaining the reporting mechanisms for public and private sources and for providing statistical data regarding AIDS diagnoses within the state. This source provides the only complete records of individual cases reported in Oklahoma. The Division also has the ultimate responsibility for protecting the confidentiality of both individuals and facilities, and therefore access to this information is, of necessity, closely guarded and available only to a very few. Statistical reports, relevant to each case diagnosed, are forwarded by code number and not by name to the Center for Disease Control in Atlanta for monitoring disease trends on a national level. Overall general statistics are made available to the public, however individual identities, specific geographic locations, and the reporting facilities and attending physicians remain confidential to protect all those involved and to avoid extreme and unwarranted public reactions. This agency was the source for annual case totals, individual survival times, and the specific hospitals reporting new diagnoses of AIDS. This allowed the targeting of facilities that possessed financial data pertaining to specific patients over the reporting years.

Summarizing the amount of charges incurred in hospital admission per AIDS patient was the result of direct contact with the managing facilities. In Oklahoma, eight hospitals processed the admissions of 87 percent of the total cases reported. Seven of these facilities responded to the request for admission figures with complete accounts, although

some of the earliest financial records were no longer available. The accumulated reports did provide statistics on 71 percent of the Oklahoma AIDS patients through calendar year 1985. This is a compilation of the most complete information accessible.

Finding a price index for hospital charges in Oklahoma proved very difficult. Direct contact with the Oklahoma Health Planning Commission, the Oklahoma Hospital Association, and even the Federal Health Care Administration could provide no indices for Oklahoma. The latter federal agency did verbally provide a consumer price index for hospital costs on a national average. This set of indices was therefore employed as a guide in adjusting annual rates for 1983-85 to an overall 1985 dollar level.

Forecasting Technique

Creating a forecast for anticipated morbidity is a more restricted proposition due to the limited amount of data available in terms of the short period of history since the recognized emergence of AIDS. As previously mentioned, with only three years of recorded data relating to AIDS diagnoses in Oklahoma, many forecasting techniques are severely limited in application. In general, many of the accepted time series forecasting methods require much more than three data points for very meaningful interpretations (Makridakis, Anderson, Carbone, Fildes, Hibon, Lewandowski, Newton, Parzen, and Winlder, 1984). However, one relatively simple, but realistic, method of predicting new cases on an annual basis is to graph the known morbidity and extend the resulting line into the short-run future. Finding the shape of a line which best fit the recorded data points would permit an acceptable forecast based on the

extension of this line for three future periods. To carry this line very far would be quite risky considering the small base of historical data that exists.

The Interactive Financial Planning System (IFPS) provides a program which will effectively meet these needs. This system, developed by Dr. Gerald R. Wagner, is a user friendly mainframe computer program with a large variety of related functions (Gray, 1983). Primarily designed for business application, the system offers many mathematical and statistical operations in addition to the basic financial functions. The system is becoming more popular for strategic planning in companies with mainframes because of its easy commands and functional variety.

IFPS has three specific options available to address the current problem under the POLYFIT command. POLYFIT specifically enables the user to extrapolate a single variable into the future. POLYFIT(0) averages all past values and assumes future values equal to this average. POLYFIT(1) fits a linear regression line to the given data and extends this to determine future values. The third option, POLYFIT(2), establishes a best-fit quadratic equation to the data points and extrapolates future values to the chosen limits. All three options may be employed in a single run with the given set of data.

Results and Forecasts

The cumulative total of AIDS cases in Oklahoma has reached 42 in the first three years of reporting. This breaks down to five reports in 1983, 12 in 1984, and 25 in 1985. These cases determined the identification of eight hospitals in Oklahoma which should have the

desired financial data on hospital admission charges. Records on 30 patients were accumulated for this study.

In conjunction, the national hospital cost indices were obtained and were noted to reflect a decline in the rate of increase over the period of study. In comparison with 1983's rate of 12.0 percent over 1982, the indices needed for cost adjustment illustrated dramatic declines. For 1984, the rate was 9.2 percent over 1983 charges, and the 1985 index was only 7.0 percent greater than 1984. No estimates were available for 1986 or beyond. By applying the appropriate indices to expenses incurred in the corresponding years, charges accumulated in each calendar year could be equated to a standard scale, which in this example is 1985 dollars. This affords a realistic picture of AIDS admission expenditures anticipated over the next three years.

Incorporating these indices with the financial data obtained on the 30 Oklahoma AIDS cases revealed a sum total of $747,316. This averages just under $25,000 per diagnosed patient. The individual charges ranged from a low of $3,957 to a high of $77,659, ultimately depending upon the patient's survival and type of opportunistic infection encountered. The significance of this is magnified in the context of the mean survival time of only four months.

In terms of admission days, the averages were computed for 25 individuals in two categories, those already deceased and those still surviving at the end of 1985. For those deceased AIDS victims, the average number of days of hospital admission equalled 35. In contrast, those who were still living averaged 37 hospital admission days through the end of 1985. Again, these are actual admission days and do not represent any outpatient visits or office exams. Variations were

apparent in these figures also as hospital admissions ranged from 3 to 104 days.

A further computation of cost-per-day charges revealed $708 for those AIDS victims who had died as opposed to $582 for individuals who still were alive. This significant difference may be a result of the living patients not yet approaching the severe physical collapse occurring near time of death and the extreme cost and intensity of the associated medical management at that point.

In the IFPS program, all three specific POLYFIT options were employed to evaluate which method provided the most realistic expectations based on the observed data. POLYFIT(2), with the use of a quadratic equation, developed the most reasonable forecast of AIDS morbidity for Oklahoma. In this instance, the reported cases of AIDS for 1983-85 were entered into the program, and an extrapolation for 1986, 1987, and 1988 were requested. The resultant predictions for the next three years are anticipated to be 44, 69, and 100 cases respectively. Appendix G graphically illustrates the known and expected AIDS morbidity.

Although variations in reports make direct evaluation difficult, these forecasts are supported in comparison with both national and regional trends. In the United States, the reported AIDS cases have increased each year from the 12 attributed to 1979 to the 6,571 in 1985 (see Appendix D). However, the rate of increase over this time period has slowed by an average of 28 percent. In comparison, the rate of increase for Oklahoma's known and predicted volume of AIDS diagnoses decreases by an average 25 percent.

In terms of a regional comparison, the state of Texas provides very useful information. Texas first reported a case of AIDS in 1980, and

through 1985, the cumulative totals reflect 80 percent in the homosexual or bisexual risk group and three percent in the intravenous drug user segment. Thus, Texas offers a patient population similar to Oklahoma in risk factors, and yet, has a history of AIDS reports three years longer than Oklahoma. For the calendar years 1980 through 1985, Texas reported 2, 8, 29, 128, 320, and 598 AIDS cases respectively. The average rate of increase in these reported cases decreased by 20 percent. This rate also compares in reasonable fashion to the average decline in the rate of increase predicted for Oklahoma.

Obviously, the predictions represent very significant increases. The 1986 value of 44 is more than the cumulative total for the three years of known AIDS case reports in Oklahoma. These new cases would bring Oklahoma's cumulative AIDS morbidity total to 86. If the average hospital admission charges per AIDS patient, in 1985 dollars, are applied to this anticipated morbidity, the debt will reach $1,100,000. Very conservatively, this would represent 1,450 admission days attributable just to the newly diagnosed.

An additional reported 69 cases of AIDS in 1987 could result in an additional financial burden of $1,725,000. This is $625,000 higher than 1986. Inflation rates for this year could bring this amount even higher. The required hospital admission days would rise to 2,415.

Finally, in 1988, the first-time diagnoses of AIDS may reach 100 individuals. This would translate into $2,500,000 in admission expenses. In the context of 1985 dollars, this is more than double that anticipated for 1986. In hospital admits, this reflects 3,500 days.

The three-year expenditure for hospital expenses totals $5,325,000, with 7,365 days of admission. This assumes a constant average for

admissions equalling that already observed. This is well on the conservative side as increases in survival times will have a definite effect on these estimates.

CHAPTER IV

IMPLICATIONS

Difficulty of the Situation

The results obtained in this evaluation are based upon observations of the existing, yet admittedly limited, data on AIDS patients in Oklahoma. The documented survival times for these patients, at an average of four months, is dramatically lower than the 18-month average reported on a national scale. If the Oklahoma survival period begins to approach that seen nationally, the overall expenditures for maintaining AIDS victims will increase accordingly. However, the degree of the effect, brought on by a longer survival rate, will have to be determined as the bulk of these particular expenditures accumulate at time of diagnosis and at time of death, with sporadic admissions in between these points of reference. A four-month survival period severely limits the opportunity to draw any meaningful conclusions in comparing total cost increase with survival times.

The overall figures indeed represent a conservative stance in planning for future costs. This study only takes into account expenditures directly related to hospital admissions of AIDS patients. Not included are expenses for outside treatment, outpatient therapy, or even physician consultations. Also, the morbidity figures for Oklahoma include only patients living in the State at the time of diagnosis. While just one or two individuals moved away after diagnosis, at least 20

patients, diagnosed elsewhere, have returned to Oklahoma to live out what time they have left. These patients will require the services of the hospital facilities, as will those individuals suffering from HIV-related maladies which do not meet current CDC criteria for AIDS diagnosis. The number of people included in this last category is unknown since no reporting mechanism exists for recording that specific condition. However, that number is believed to be much larger than the number of diagnosed AIDS cases.

The anticipated admission costs are very significant. Individual charges ranged from approximately $4,000 to over $77,000. The rise from an estimated $1.1 million in 1986 to $2.5 million in 1988 represents a two-fold increase as reflected in 1985 dollars. Inflation factors could make this gap even greater. Additionally, a minimum total of 3,500 admission days in 1988 for newly diagnosed AIDS cases would constitute a significant need for hospital space. This is even more poignant in view of the historical situation in which eight hospitals have managed nearly 90 percent of the reported AIDS cases. Other hospitals will no doubt become more involved as case numbers grow, yet the tendency for the bulk of the AIDS reports to occur in the urban areas of Oklahoma City and Tulsa is not expected to undergo any significant shift.

The hospital facility usage will not require any unmanageable adjustments in Oklahoma. The major metropolitan areas have enough total capacity to handle the predicted volume of AIDS cases. However a matter of deep concern revolves around the payment of the rapidly mounting costs incurred by the individual patients. This is the crux of the extreme financial burden, "Who will pick up the payments?" This will become more of a priority as the AIDS morbidity rises.

The individual diagnosed with AIDS is most often incapacitated to the point that he/she is unable to maintain employment. Therefore, unless independently wealthy, most AIDS victims have a very difficult task in meeting day-to-day expenses, even without having to face the burden of high medical charges. And this burden is significant with a $25,000 bill accumulated in roughly four months. Longer survival times will certainly acerbate this problem if other circumstances remain constant. In almost every case, the patient is unable to pay the hospital bills without some form of outside assistance.

For those employed at the time of AIDS diagnosis, insurance programs and company health plans have covered a great share, but not necessarily all, of the incurred hospital expenses. Consequently, these companies cannot afford, over time, to continue to finance the level of expenditure related to potential increases in AIDS admissions. This difficulty is compounded by the primary occurrence of AIDS in those age groups that routinely require less costly medical procedures and historically have financially supported other aspects of the overall health care program. As a result, the insurance industry has begun studying and moving toward avoidance of AIDS-related expenses (Shahoda, Lashley, and Firshein, 1986). This has been approached through requirements for HTLV-III antibody testing as part of an acceptance physical examination process and by excluding AIDS-related conditions from coverage. Instances of insurance being denied to those with positive antibody tests have already become common. Another suggested alternative is to develop specific AIDS insurance policies along the lines of cancer insurance programs. Those participating in this type of schedule would, of course, pay a much higher premium.

Other potential, and often expected, sources of financial aid are governmental programs. In many parts of the United States, local governments have established various forms of financial assistance for AIDS victims. For the most part, these efforts have not been of sufficient magnitude to support anything beyond an individual's daily survival, if that. Paying hospital admission charges would not even be considered, and with the prevailing economic conditions in Oklahoma, this has very slim potential for change.

The next level of possible government aid is the State of Oklahoma. Here again the economy will severely limit any subsequent response. Financial support will most likely be directed to day-to-day survival for the patient with AIDS. However, lobbying activity to the State Legislature by the hospital associations may bring indirect relief to the private institutions, especially through greater funding for teaching hospitals. By giving AIDS victims greater access to the "free" facilities, pressure to admit these patients to local private hospitals will decrease. However, with only one teaching hospital in the State, and that being located in Oklahoma City, access for patients is still constrained.

On the federal level, AIDS patient support is again limited. Most federal grants have been directed at screening tests or research. However, Supplemental Security Income (SSI) payments, while automatically allowed to those with AIDS diagnoses for disability, provides monthly payments of less than $300 to individuals, and this only if they have no other income and meet strict regulations on property ownership. The current limit on personal resources is $1,600. This provides basic survival monies. Another potentially applicable federal/state program is

Medicaid, which does pay hospital costs for disabled patients. A problem arises in that the required period of infirmity for disability qualification is 24 months. With AIDS patients in Oklahoma surviving only four months, few can qualify for this program.

The last alternative, that many hospitals have been forced to accept, is that of just absorbing the loss. Some of this amount can be written off for tax purposes as bad debt or as good will. However, in the majority of cases, the unpaid bills are extremely high. As a direct result of unacceptable losses, some of the institutions have refused to admit AIDS patients or have attempted to refer them to another facility. This action not only creates hardship for the individual, but promotes ill will among the hospitals and can damage the health care reputation within the community. This can also open the door for lengthy and costly law suits.

Nevertheless, several positive courses of action are available in managing this very difficult circumstance which will obviously become more severe in the near future. While little can be done to cure or immunize against AIDS, much can be done to avoid spreading the infection and to manage those cases which already exist.

Positive Approaches

Education targeted to high risk groups and the community in general is the most effective weapon against the spread of AIDS currently. Governmental agencies on all levels are becoming more involved in this type of activity, as are private organizations, such as the American Red Cross. The hospitals, individually and collectively, stand to gain in the long run by a decrease in the number of new AIDS cases. Even if

financial support for patients is increased through various agencies, the dramatically rapid rise in AIDS morbidity will more than overshadow the available relief. Therefore, hospitals stand to benefit, in the long run, from encouraging or even becoming involved in directed educational efforts.

Another factor, contributing to the high hospitalization costs associated with AIDS, has been unnecessary admissions. Because the syndrome has presented such a new medical curiosity, admission had become a standard procedure for every reported ailment. This activity has no foundation in the medical management for the individual patient and has certainly resulted in a significant number of excessive hospital days. Many of the AIDS-related maladies can be effectively controlled on an outpatient basis, which is a much cheaper and more cost effective attitude without compromising patient care.

In accordance with sound management, the prevention of antibody-stimulating infections can help retard the viral spread within the host organism. The use of killed-virus vaccines has proven to be effective. Through employment of these types of vaccines to immunize against such diseases as influenza, pneumococcus, and hepatitis, the immune system has less opportunity to become stimulated, and thus reduces the chance of spreading the invading HIV. Thus, with preventative medical action, the hospital should see a reduced need for admissions by potentially decreasing the number of recurrent infections.

Another less expensive alternative is care for the AIDS patient outside the hospital setting. In the past, AIDS victims who only required intermediate medical care were forced into the skilled care hospital facilities simply because the intermediate level nursing was not

available to them. For those patients able to stay at home, visiting health care nurses are a viable means of medical assistance. Essentially not a free service, the cost is far less than hospital admission. This is a program that is currently seeking federal aid and could be implemented as an outreach hospital program. In fact, many hospitals already have initiated similar activities for aiding the elderly and other classes of homebound patients.

For those patients unable to maintain a home, or with no family, another type of program is developing. A few communities in Oklahoma have undertaken the task of providing a residence for AIDS patients requiring care on the intermediate or lesser levels. Staffing functions, in general fashion, seek results similar to that realized by home health nursing. However, support from local hospitals would still be invaluable in maintaining such facilities. This also would tend to be more economical in the long run as costs related to admitting these patients to hospitals would far exceed the required investment.

Finally, more grants are becoming available to employ experimental drugs in managing AIDS cases. The Federal Drug Administration is permitting wider use of these types of medications in light of the extreme mortality associated with AIDS. These grants have the effect of paying much of hospital admission costs. Therefore the participating facility would have the opportunity to realize reimbursement for charges that would otherwise be lost.

In summary, Oklahoma hospitals are going to have to face a significant and growing financial drain inherent in the sheer number of developing AIDS cases. No one single answer will cure all the ills, but many alternatives, some most effective in combination, are available.

With no medical cure or realistic preventative on the horizon, hospitals need to employ more efficient and imaginative methods of financial planning concerning AIDS patients without sacrificing sound medical care. AIDS morbidity will be increasing dramatically in a very short period of time in Oklahoma. Plans of action by hospitals and their associations should be placed in motion now rather than being forced to react later as the situation intensifies.

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APPENDICES

APPENDIX A

DEMOGRAPHIC BREAKDOWN OF REPORTED AIDS CASES IN U.S.

ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS)
WEEKLY SURVEILLANCE REPORT* - UNITED STATES
AIDS ACTIVITY
CENTER FOR INFECTIOUS DISEASES
CENTERS FOR DISEASE CONTROL
December 30, 1985

UNITED STATES CASES REPORTED TO CDC

1. DISEASE GROUP†**

	ADULT/ADOLESCENT				PEDIATRIC††				TOTAL			
	CASES	(%)	KNOWN DEATHS	(%)	CASES	(%)	KNOWN DEATHS	(%)	CASES	(%)	KNOWN DEATHS	(%DEAD)
Both KS and PCP	895	(6)	575	(64)	4	(2)	4	(100)	899	(6)	579	(64)
KS without PCP	2959	(19)	1140	(39)	6	(3)	6	(100)	2965	(19)	1146	(39)
PCP without KS	9013	(57)	4734	(53)	129	(56)	90	(70)	9142	(57)	4824	(53)
OI without KS or PCP	2852	(18)	1576	(55)	90	(39)	36	(40)	2942	(18)	1612	(55)
Total	15719	(100)	8025	(51)	229	(100)	136	(59)	15948	(100)	8161	(51)

2. AGE

AGE	CASES	(%)
Under 13	229	(1)
13 - 19	71	(0)
20 - 29	3332	(21)
30 - 39	7495	(47)
40 - 49	3323	(21)
Over 49	1498	(9)
Total	15948	(100)

3. RACE/ETHNICITY

RACE/ETHNICITY	ADULT/ADOLESCENT CASES	(%)	PEDIATRIC†† CASES	(%)	TOTAL CASES	(%)
White, not Hispanic	9429	(60)	44	(19)	9473	(59)
Black, not Hispanic	3868	(25)	136	(59)	4004	(25)
Hispanic	2225	(14)	46	(20)	2271	(14)
Other	86	(1)	0	(0)	86	(1)
Unknown	111	(1)	3	(1)	114	(1)
Total	15719	(100)	229	(100)	15948	(100)

4. PATIENT GROUPS**

	ADULT/ADOLESCENT MALES	(%)	FEMALES	(%)	TOTAL CASES	(%)
Homosexual or Bisexual Men***	11513	(78)	-	(-)	11513	(73)
Intravenous (IV) Drug User	2139	(15)	545	(53)	2684	(17)
Hemophilia/Coagulation Disorder	119	(1)	4	(0)	123	(1)
Heterosexual Contact†††	28	(0)	151	(15)	179	(1)
Transfusions with Blood/Blood Products	154	(1)	98	(10)	252	(2)
None of the Above/Other****	740	(5)	228	(22)	968	(6)
Total	14693	(100)	1026	(100)	15719	(100)

	PEDIATRIC†† MALES	(%)	FEMALES	(%)	TOTAL CASES	(%)
Hemophilia/Coagulation Disorder	11	(9)	0	(0)	11	(5)
Parent with AIDS/or at increased risk for AIDS††††	87	(70)	85	(82)	172	(75)
Transfusion with Blood/Blood Products	22	(18)	12	(12)	34	(15)
None of the above/Other	5	(4)	7	(7)	12	(5)
Total	125	(100)	104	(100)	229	(100)

*These data are provisional

†KS = Kaposi's sarcoma; PCP = Pneumocystis carinii pneumonia; OI = Other opportunistic infections

**Groups listed are ordered hierarchically; cases with multiple characteristics are tabulated only in the group listed first.

††Includes patients under 13 years of age at time of diagnosis.

***1267 (11%) of homosexual men also reported having used IV drugs

†††With a person with AIDS or at risk for AIDS

****Includes 391 persons born in countries in which most AIDS cases have not been associated with known risk factors.

††††Epidemiologic data suggest transmission from infected mother to child before, at, or shortly after the time of birth.

APPENDIX B

SAMPLE OF AIDS CASE REPORT FORM LISTING DIAGNOSTIC OPPORTUNISTIC INFECTIONS

AIDS BRANCH
DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333

ACQUIRED IMMUNODEFICIENCY SYNDROME (AIDS) CONFIDENTIAL CASE REPORT

FORM APPROVED
OMB NO. 0920-0009

44

This report is authorized by law (Sections 304 and 306 of the Public Health Service Act, 42 USC 242b and 242k). Response in this case is voluntary for federal government purposes, but may be mandatory under state and local statutes. Your cooperation is necessary for the understanding and control of AIDS. Information in the surveillance system that would permit identification of any individual or establishment is collected with a guarantee that it will be held in confidence, will be used only for the purposes stated in the assurance on the reverse of the form, and will not otherwise be disclosed or released without the consent of the individual or the establishment in accordance with Section 308(d) of the Public Health Service Act (42 USC 242m).

DATE FORM COMPLETED — Mo. ☐☐ Day ☐☐ Year ☐☐

SOUNDEX NAME CODE ☐☐☐☐

HEALTH DEPARTMENT USE ONLY
STATUS OF THIS REPORT: [1] New Case [2] Update Report
REPORTING HEALTH DEPARTMENT: State _____ City/County _____

CDC USE ☐☐ ☐☐☐☐

I. BASIC PATIENT INFORMATION

Date of Birth — Mo. ☐☐ Day ☐☐ Year ☐☐

Age at Diagnosis of AIDS — Years ☐☐

Current Status: [1] Alive [2] Dead: Date of Death — Mo. ☐☐ Day ☐☐ Year ☐☐ [9] Unknown

CDC PATIENT NUMBER ☐☐☐☐☐☐

STATE PATIENT NUMBER ☐☐☐☐☐☐☐☐☐☐

CITY/COUNTY PATIENT NUMBER ☐☐☐☐☐☐☐☐☐☐

Sex: [1] Male [2] Female

Race/Ethnicity: [1] White (not Hispanic) [2] Black (not Hispanic) [3] Hispanic [4] Asian/Pacific Islander [5] American Indian/Alaskan Native [9] Not Specified

RESIDENCE AT ONSET OF ILLNESS SUGGESTIVE OF AIDS:

City _____ Zip Code ☐☐☐☐☐☐☐☐☐

County _____ State/Country _____

CDC USE — CITY ☐☐☐☐ COUNTY ☐☐☐ STATE ☐☐

HOSPITAL WHERE DIAGNOSIS OF AIDS ESTABLISHED:

Name _____

City _____ State _____

HOSPITAL ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

CITY ☐☐☐☐ STATE ☐☐

II. DISEASES AT LEAST MODERATELY INDICATIVE OF CELLULAR IMMUNODEFICIENCY AND AIDS

DISEASE *(Check all that apply)*	Date of Specimen or Diagnosis — Mo. ☐☐ Year ☐☐	Method of Diagnosis (Check One): Microscopy (Histology Cytology)	Other
[ ] Kaposi's sarcoma	☐☐ ☐☐	[1]	[0]
[ ] *Pneumocystis carinii* pneumonia	☐☐ ☐☐	[1]	[0]
[ ] Toxoplasmosis (exclude if only in liver spleen, muscle, or lymph nodes) [1] Brain/CNS [8] Other Site	☐☐ ☐☐	[1]	[0]
[ ] Cryptosporidiosis with diarrhea persisting > 1 mo.	☐☐ ☐☐	[1]	[0]
[ ] Cytomegalovirus infection histopathologically documented (exclude if only in liver, nodes, or mononucleosis syndrome, or diagnosis by serology or culture alone)	☐☐ ☐☐	[1]	[0]
[ ] Primary lymphoma of brain	☐☐ ☐☐	[1]	[0]
[ ] Progressive multifocal leukoencephalopathy (Papovavirus infection, brain)	☐☐ ☐☐	[1]	[0]
		Endoscopy/Autopsy with culture, microscopic, or gross exam of esophagus	Other
[ ] Candida esophagitis	☐☐ ☐☐	[1]	[0]
		Culture	Other
[ ] Atypical (non-tuberculous) mycobacterial infection, disseminated, e.g. bone marrow or multiple organ involvement (exclude if only pulmonary and/or lymph node infection)	☐☐ ☐☐	[1]	[0]
Species: [1] *M. avium-intracellulare* [8] Other, (Specify): _____			
		Microscopy, Culture, or Antigen	Other
[ ] Cryptococcal infection (exclude pulmonary only) [1] Meningitis [2] Other internal organ [3] Blood	☐☐ ☐☐	[1]	[0]
[ ] Chronic mucocutaneous herpes simplex infection persisting > 1 mo.	☐☐ ☐☐	[1]	[0]

CDC USE SPECIES ☐☐

III. OTHER OPPORTUNISTIC OR UNDERLYING DISEASES

PATHOGEN/DISEASE	ANATOMIC SITE	DATE OF SPECIMEN OR DIAGNOSIS — MO. ☐☐ Yr. ☐☐	CDC USE: PATHOGEN/DISEASE ☐☐	CDC USE: ANATOMIC SITE ☐☐

APPENDIX C

AIDS CASES IN U.S. BY SELECTED SMSA'S

All AIDS Cases Per Million Population (from the 1980 Census), by Standard Metropolitan Statistical Area (SMSA) of Residence, Reported from June 1, 1981 to December 30, 1985 - United States

SMSA of Residence	Cases	Percentage Of Total	Cases Per Million Population
New York, NY	5063	32	555.1
San Francisco, CA	1744	11	536.5
Miami, FL	498	3	306.3
Newark, NJ	398	2	202.4
Los Angeles, CA	1328	8	177.6
Elsewhere (irrespective of SMSA)	6917	43	33.9
Total - United States	15948	100	70.1

Table total includes 8 cases diagnosed prior to 1979.
Center for Disease Control
U.S. Printing Office

APPENDIX D

REPORTED AIDS CASES AND FATALITY RATES BY HALF-YEAR OF DIAGNOSIS IN THE U.S.

All Reported Cases of AIDS And Case-Fatality Rates by Half-Year of Diagnosis, 1979 - December 30, 1985, United States

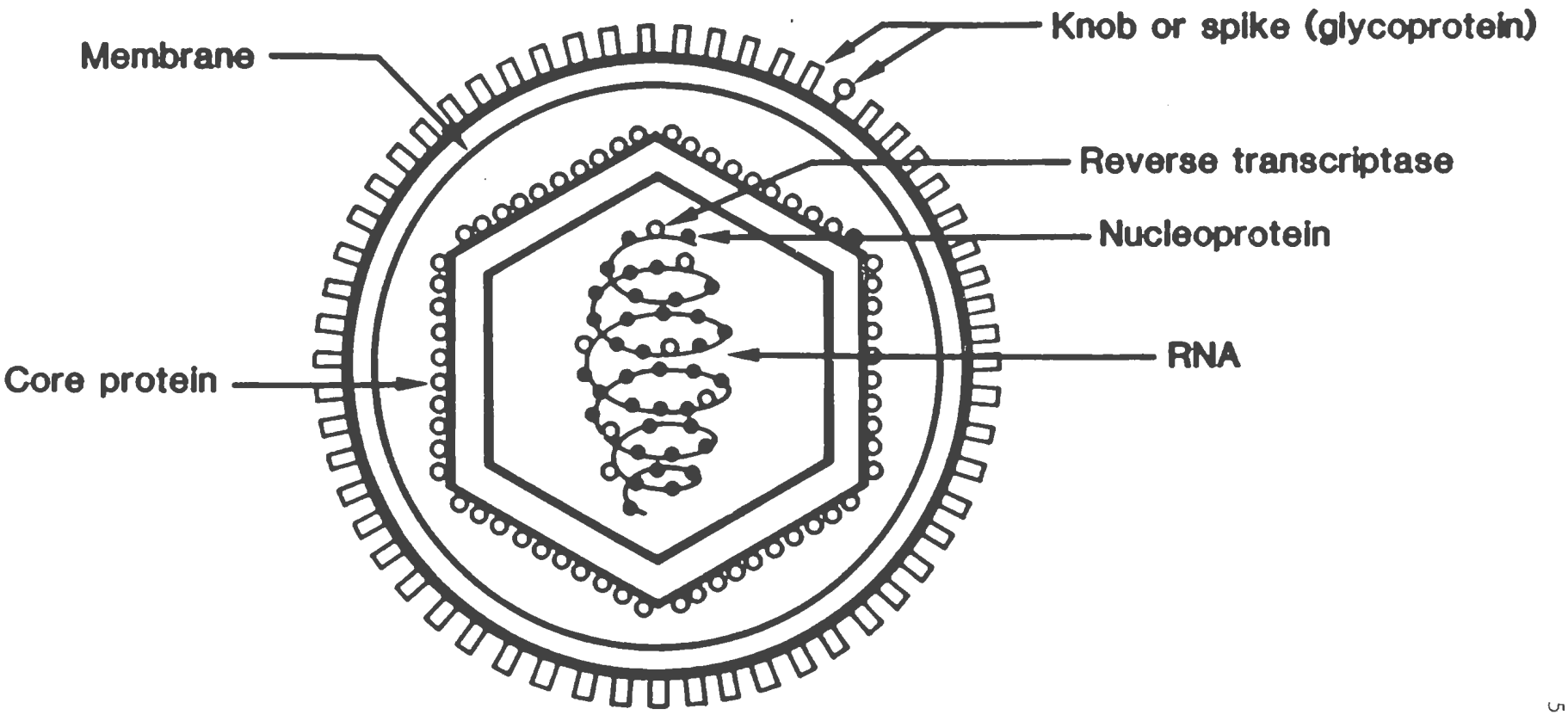
	Number of Cases	Number of Known Deaths	Case-Fatality Rate
1979 Jan.-June	3	2	67%
July-Dec.	9	8	89%
1980 Jan.-June	18	15	83%
July-Dec.	29	27	93%
1981 Jan.-June	86	72	84%
July-Dec.	174	147	84%
1982 Jan.-June	360	277	77%
July-Dec.	632	462	73%
1983 Jan.-June	1182	849	72%
July-Dec.	1535	1125	73%
1984 Jan.-June	2340	1548	66%
July-Dec.	3001	1622	54%
1985 Jan.-June	3792	1401	37%
July-Dec. 30	2779	602	22%
Totals	15948	8161	51%

Table total includes 8 cases diagnosed prior to 1979. Of these 8 cases, 4 are known to have died.
Center for Disease Control
U.S. Printing Office

APPENDIX E

DIAGRAM OF RETROVIRUS

RETROVIRUS


Membrane
Knob or spike (glycoprotein)
Reverse transcriptase
Nucleoprotein
RNA
Core protein

APPENDIX F

CUMULATIVE TOTALS OF AIDS CASES IN OKLAHOMA THROUGH 1985

ACQUIRED IMMUNODEFICIENCY SYNDROME

OKLAHOMA

CUMULATIVE TOTALS

December 31, 1985

OKLAHOMA CASES REPORTED

	Cases	Known Deaths	% Dead
KS without PCP	5	1	20%
Both KS and PCP	2	1	50%
PCP without KS	26	17	65%
Other Infections	9	3	33%
	42	22	52%

(Mean survival from date of diagnosis - 4.0 months)

AGE

< 13	--
13-19	--
20-29	13
30-39	22
40-49	3
> 50	4
Unknown	--
Total	42

(Mean age 34 years)

RACE

White	35	83%
Black	6	14%
Indian	1	2%
Other	--	-- %
Total	42	

SEX

Male	42	100%
Female	--	--
Total	42	100%

TRANSMISSION CATEGORIES

Homosexual or Bisexual Men	37	88%
I.V. Drug User	2	5%
Blood Transfusion	1	2%
None/Other	2	5%
	42	100%

APPENDIX G

GRAPHIC REPRESENTATION OF KNOWN AND PREDICTED AIDS CASES IN OKLAHOMA BY CALENDAR YEAR

AIDS Cases -- OKLAHOMA
Number of Cases
1200
1080
960
840
720
600
480
360
240
120
0
1983
1984
1985
1986
1987
1988
Calendar Year of Diagnosis
Reported Cases
Projected Cases

VITA

William R. Pierson

Candidate for the Degree of

Master of Business Administration

Report: A THREE-YEAR FORECAST OF HOSPITAL ADMISSION COSTS OF AIDS PATIENTS IN OKLAHOMA

Major Field: Business Administration

Biographical:

Personal Data: Born in Shelbyville, Indiana, June 3, 1949, the son of Clinton and Norma Pierson.

Education: Graduated from Shelbyville High School, Shelbyville, Indiana, in May, 1967; received Bachelor of Science degree from Indiana State University with a major in Life Science, May, 1971; completed requirements for the Master of Business Administration degree at Oklahoma State University in December, 1986.

Professional Experience: STD Assistant Director, Broward County Health Department, Florida, 1978; Public Health Advisor, Center for Disease Control, 1979-1980; Administrative Officer, Oklahoma State Department of Health, 1981 to present.