THE EFFECTS OF AIDS ON THE INSURANCE INDUSTRY

An Honors Thesis (ID 499)

by

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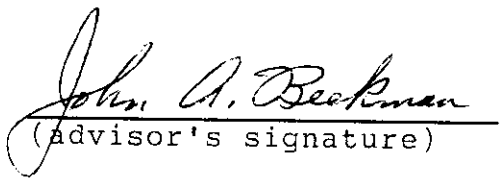

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Ball State University

Muncie, Indiana

February, 1988

Expected date of graduation (Spring, 1988)

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Introduction

AIDS. This word has been in the eyes of the public for many years. The disease has had effects politically, socially, morally, and financially on the public. It has caused individuals to carefully examine their attitudes and behaviors, because these behaviors now can be life-threatening.

Although AIDS can be examined in many areas, this paper has focused on the effects AIDS is having and going to have on the insurance companies. Of course, there have been many publications on the financial effects of AIDS on the insurance industry. It is from such publications that I have gathered the information contained in this paper. I have gathered much of my information from Cowell and Hoskin's report on HIV mortality [8]. Their paper was very interesting and one of the first articles that started my interest in this subject. Other books and articles noted throughout this paper and on the reference page have also added to my research.

It must also be noted that this topic is very current. Laws are currently being enacted, reversed, and debated. Research and studies are being published on several facets of this disease. It is such a current topic that one can hardly read the newspaper, listen to the radio and/or watch TV without hearing AIDS mentioned at least once a day. Unfortunately, this disease has taken from our society many lives, but fortunately groups are acting to prevent its spread and working to estimate its effects.

In the upcoming Volume 40 of the Transactions of the Society of Actuaries, there will be an article titled "AIDS: Survival Analysis of Persons Testing HIV+" by Harry H. Panjer, Ph. D., F. S. A., F. C. I. A. This is another analysis of the Frankfurt study data. However, the methods used to analyze the data are a little more formal than the methods used by Cowell and Hoskins [8]. I am anxious to further study this information on HIV mortality.

As more information becomes available, I plan to study it. This topic is intriguing and challenging. I believe that it is hard to underestimate its effects, and as I have found in my research, it will eventually touch everyone's life in some manner.

Acknowledgements

There are a few people I would like to thank for their help in my work. A thank you must go to Mike Zurcher, FSA, from Lincoln National Life. He allowed me to participate in some of his work for the Society of Actuaries' AIDS Task Force. He was developing a system to estimate Group claim's experience due to AIDS. Unfortunately, this report is to be published at a later date so I could not use it in my research to this point. However, the knowledge I gained from the work was invaluable. He also provided me with the opportunity to meet professionals highly involved with the AIDS issue, such as Walt Hoskins, Dr. Donald Chambers, and Jess Mast. I have used some of their work in my research.

Also, I need to thank Dr. John Beekman at Ball State University. He has given me endless advice and confidence in my work. I hope to continue to research and write because he has taught me that this is a valuable part ot the actuarial profession. Also, he has provided me with the opportunity to speak at Ball State University on the financial effects AIDS is having on life insurance companies.

Section 1

AIDS As a Disease

A. History of Aids

Acquired Immune Deficiency Syndrome was first diagnosed in the spring of 1981. Infections that normally retreat were abnormally affecting a few patients, mostly gay men, in certain geographic areas during the late 1970's and early 1980's. Most of the infections should have presented few problems unless the patient had an impaired immune system.

Late in 1979 and early in 1980, doctors in Los Angeles, San Fransisco, and New York became documentors for what was to become known as AIDS. When investigating cases of toxoplasmosis, Kaposi's sarcoma cytomegalovirus, candida, and most frequently pneumocystis in gay men, doctors found the patients' immune systems to be in shambles. On June 5, 1981, five cases of pneumocystis in gay males were reported to the Centers for Disease Control (CDC), a federally funded disease research facility. Dr. James Curran, then chief of the Venereal Disease Research Department, took note of this report and by midsummer had discovered many more similar cases. By 1982, it was evident the disease was not only a gay male disease but was afflicting Haitians, prostitutes, women, and hemophiliacs.

Black states that Curran credits Don Armstrong with coining the term AIDS, acquired immune-deficiency syndrome, in 1982,[3, p. 60]. Once the name was out, several more diseases and infections were associated with AIDS including lymphadenopathy, lupus, anemia, and other diseases.

In the search for the cause, scientists in May of 1984 isolated the human retrovirus associated with AIDS. Scientists from the National Institutes of Health termed this HTLV-III, human T-lymphotropic virus type III. Other terms have been applied including AIDS-related virus (ARV), and lymphadenopathy-associated virus (LAV) [15, p. 5]. HIV, human immune-deficiency virus, is a name commonly used and the one chosen for this paper. T-helper lymphocytes and central nervous cells are susceptible to this virus, and the virus prevents these cells from normal performance [15, p. 6].

Currently cases are being reported to the CDC and extensive work is being done to find a cure. Certain drugs are being studied that perhaps can stop the spread of the virus through the body. This disease is difficult to study because of the unusual characteristics, including a latency period before the disease is even noticed. The work is complex and challenging but necessary.

B. Characteristics of AIDS

HIV can be spread in a number of ways. Sexual contact, intravenous-drug use, blood transfusion, and passage from mother to baby account for almost all cases of AIDS. "The virus is most commonly transmitted by an activity that exposes mucous membranes or the blood stream to infected blood or semen." [11, p. 5]. HIV is a fragile virus and is easily killed with soap, Clorox, or drying so intimate contact is necessary for the spread. It cannot be acquired by casual contact. Prevention then can be practiced by abstaining from activities that involve risk of getting the

disease from an infected person.

Early symptoms of AIDS are generally sporadic, and most AIDS patients feel very tired and weak initially. Early symptoms include night sweats, fevers, diarrhea, weight loss, and shortness of breath. As the disease progresses, an infected person may have lymphadenopathy, blue or purple spots on the body, pneumonia, or oral thrush [11, p. 7]. In the last stages of AIDS, the person usually develops pneumonia, Kaposi's sarcoma, and/or other infections and cancers [11, p. 7].

An inflicted person may not know of the HIV infection because of the latency period to see any signs of this disease. The progression to AIDS can be quite a few years, and therefore different stages are generally defined in studies to mark progressions in the disease. Cowell and Hoskins use the Frankfurt Study classifications and these include the following:

(At-Risk)	1a	* Healthy persons at risk for HIV infection, but testing negative
(HIV+)	1b	* Otherwise asymptomatic persons testing HIV positive
(LAS)	2a	* Patients with HIV infection and lymphadenopathy, together with moderate cellular immune deficiency
(ARC)	2b	* Patients with HIV infection and LAS together with severe cellular immune deficiency (AIDS-related complex, or ARC)
(AIDS)	3	* Patients with AIDS as defined by CDC.

This information was taken from [8] on page 8. Cowell and Hoskins note that this approach closely relates the "Walter Reed Staging Method." The final stage of the approach is death.

"Of course strictly speaking AIDS is not a disease

at all: it is a syndrome." [12, p. 9]. Hancock and Carim point this out because AIDS manifests itself in various infections and cancers. Therefore, defining stages has been difficult. Sometimes the lines are hard to draw, but most studies have relied on the definitions used by CDC. These lines are defined by results on medical tests performed by doctors.

C. Distribution of Virus

"In Lives and Dollars, The Epidemic's Toll Is Growing Inexorably" is the title of a Wall Street Journal article [6, p.1]. AIDS has been classified as one of the worst epidemics of modern times, but as an epidemic, it has some unusual characteristics. "In the early stages of an epidemic, the number of people infected with the virus grows at an exponential rate. Because HIV is sexually transmitted, its curve differs from that of measles, where the population of infections and susceptible individuals is roughly homogenously mixed." [1, p. 50]. Once the promiscuous groups are saturated with the virus, the rate of new infections will decline. Anderson and May compare the length of time of exponential growth rate of measles infection of two weeks to the expected exponential growth rate time of HIV infection of ten to fifteen years [1, p. 50]. AIDS is a very unique epidemic, and its effects are going to be here for years to come.

Although the epidemic is upon us, the spread of the disease has declined in some populations. Studies in May, 1987, in San Fransisco showed increases of 1% in cases of new infections from AIDS in homosexuals compared to 12% to 14% in peak years of 1980

to 1982 [7, p. 12]. Also, a military study showed a leveling of 1.5 infections per 1,000 in military recruits. The news is encouraging. However, so many of the future AIDS cases have already been determined. The long latency period provides the means for the virus to stay hidden for many years, and the costs will not surface until then.

The AIDS spread may have leveled in the homosexual population in some geographical areas, but has it in other areas or in other groups? In New York, in August 1987, homosexual AIDS cases were declining while AIDS in drug users was on the rise [16, p. 31]. Also, some geographical areas that were hit early with this virus may be at the peak of their spread and falling, but other areas may still be on the climb. Education has been working to combat the spread and hopefully other geographical areas will not be hit as hard.

AIDS is not a discriminating disease, and the virus can infect anyone. However, current cases of AIDS are associated with just a few risk groups. Currently, male homosexuals account for 70% to 80% of AIDS cases. The rest of the cases have resulted from needle-sharing among drug-users, transmissions from mother to baby, and blood transfusions. These groups and the sexual partners of these groups classify as the main risk groups. Data shows minority groups have been afflicted in a greater proportion. For example, in August, 1987, there were 333 cases of AIDS per million of general population in white males, 859 cases of AIDS per million of general population in

black males, and 806 cases of AIDS per million in Hispanic males [16, p. 33].

Certain geographic areas account for many of the AIDS cases. San Fransisco, New York, and Los Angeles account for about 50% of reported AIDS cases. Houston, Miami, Washington D.C., Newark, Philadelphia, and Dallas add another 15% of the AIDS cases. Sixty-five percent of AIDS cases then are concentrated in nine major cities.

Because of the non-homogenous spread of this virus, it has become a difficult task to forecast the spread of this disease. "At the beginning of an epidemic, the rate at which a virus spreads depends on two things: the probability of transmission, β, for the particular type of relationship between the infectious person and the person susceptible (for example, heterosexual man to woman, homosexual men and so on) and the 'effective average' number of such contacts with susceptible individuals, c." [1, p. 56]. In the early phases of an epidemic, the doubling rate of the spread of infection is the product βc. It has been a difficult task to model because, for example, the probability of transmission from a homosexual male to another homosexual is quite different than the probability of transmission from female to male. Also, the rate of acquiring new sexual partners or sharing needles can be quite different from any given population. Cases of HIV infection seem to be doubling every 8 to 12 months which implies $\beta c = 1$. According to Anderson and May, some data

suggests β to be equal to 0.1 and c to be equal to 10, but emphasis is made that β or c for HIV infection is not actually known [1, p. 56].

The Center for Disease Control estimates that currently 1.5 million Americans may be infected with the AIDS virus [8, p. 1]. Of the 38,000 cases of AIDS reported in the United States, 22,000 had died through mid-July 1987. These cases have incurred very great costs, and if 1.5 million Americans are HIV infected, there are tremendous costs ahead.

Jess Mast has determined estimates of prevalence rates in the general population [17]. The estimates are as follows:

Male Age	1987	1991
20-29	1.4%	3.5%
30-39	3.4%	8.6%
40-49	2.3%	5.9%

In determining the prevalence of HIV+ policy holders, an insurance company must not only consider estimates of the prevalence rates, but also the geographic mix of its business and the ages of the policy holders. The infection is distributed in a highly non-uniform manner, and each insurance company must evaluate its business to determine the effects AIDS will have on its business.

D. AIDS Studies

Since AIDS was identified, many studies on the incidence of HIV infection and AIDS have been published. One such study was done by the San Fransisco City Clinic in cooperation with the Center for Disease Control. In 1978, 6,700 blood samples were taken from male homosexuals and bisexuals in San Fransisco for a research project on Hepatitus B. After the discovery of AIDS, the frozen blood samples of two groups of volunteers were tested for HIV infection. The results of the test showed that 4% were HIV positive as early as 1978 [8, p. 10]. "In one group, 19% had progressed to AIDS by 1985, in the other, 29% had progressed to AIDS and another 42% to ARC." [8, p.10]. Studies of the data also showed that within five years after infection, 14% to 15% of HIV subjects developed AIDS, 22% to 25% developed AIDS after six years of infection, and 32% to 37% developed AIDS after seven years of infection [8, p.10]. This data suggests that there is an increased risk of AIDS in the second five years after infection.

Civilian applicants for military service were tested for HIV infection from October 1985 through March 1986, and studies were made on the results of these tests [2, pp. 131-136]. Samples were taken from 306,061 individuals with 406 testing positive and therefore showing a prevalence rate of 1.5 per 1000 applicants. "According to multivariate analysis, the

following demographic factors were found to be significant independent predictors of a positive HIV-antibody test: age (adjusted odds ratio = 1.10 per year), black race (adjusted odds ratio = 2.04), male sex (adjusted odds ratio = 1.84), residence in a densely populated county (adjusted odds ratio = 1.05 per 1000 per square mile), and residence in a metropolitan area with a high incidence of the acquired immuno-deficiency syndrome (adjusted odds ratio = 1.53)." [2, p. 131]. The population studied was young, and the arguments can be made either way concerning where the actual prevalence is compared to the 1.5 per 1000 in the study. It is possible that the homosexual and intravenous drug users are underrepresented among applicants for admission to the military which could imply a higher prevalence rate. On the other hand, socially disadvantaged populations with marginal populations that are at higher risk may be overrepresented which suggests that the prevalence rate may be lower.

A study by the Center for Internal Medicine of the University of Frankfurt, West Germany, was a comprehensive investigation of groups at high risk for AIDS through stages from good health to death primarily through AIDS. The Frankfurt study used five classifications to note progression in the disease. The stages were mentioned before in better detail but from this point will be referred to as 1a (At-Risk), 1b (HIV+), 2a (LAS),

2b (ARC), and 3 (AIDS) [8, part 1, p.2]. The sixth stage is death. Patients were observed for at least three months and were grouped by stage and length of time observed in the study. Ranges of observation periods were 3-6 months, 6-12 months, 12-24 months, and 24-36 months. Table One of part 2 in [8] shows three sets of data from the Frankfurt study. This includes the number of patients observed in each stage and each observation period, the number of patients that worsened by at least one stage during the observation period, and the percentage of those patients whose health worsened by at least one stage during the observation period. For example, in the observation period of 3-6 months, 6 patients were observed that were in Stage 3 (AIDS). Four died within the observation period which means 67% of the patients progressed to the next stage.

The Center for Disease Control also provides information on the mortality of AIDS victims. Cowell and Hoskins used the Frankfurt study and the CDC reports in their work to estimate the progression from HIV infection to AIDS to death [8]. The insurance industry can benefit from these studies of progression by estimating costs at each stage and by estimating how much of these costs can affect their business.

E. Mortality Projections

"AIDS is devastating. As of August 31, 1987, 41,366 AIDS cases have been reported to the Centers for Disease Control (CDC); of these, 23,884 or 58%, have resulted in death." [14, p. 1]. The numbers show the alarming effects this disease has had. Predicting what is to come is the challange.

Using the Frankfurt study and the Center for Disease Control mortality data, Cowell and Hoskins developed a model of HIV mortality. A Markov chain model was used to simulate progression through the various stages of the Frankfurt study that were previously defined. "The process is not unlike that of creating a life, or multiple decrement, table from a limited period of observation, by joining together the experience of successive cohorts, even though no one cohort was observed to progress through the entire range of ages or decrements represented in the table." [8, p. 12].

Cowell and Hoskins used several assumptions in developing the mortality model. The first assumption was that every person is classified by stage, using the Frankfurt staging method, and duration since progression to that stage. Secondly, a person either progresses to the next stage or stays in the same stage during a given time interval, suggesting that the disease is progressive and irreversible. Next, Cowell and Hoskins assumed that the probability of progression depended

on stage and duration in the stage, and was independent of variables such as age, sex, duration since HIV infection, and other underwriting factors. However, determining the number of people HIV infected most certainly does depend on some of these variables since the virus is not distributed in an uniform manner. The last assumption was that a uniform force of progression was used for time periods shorter than the observation periods.

The model produced annual AIDS mortality rates of 45% in the first year of AIDS, 45% in the second year of AIDS, 35% in the third year of AIDS, and 25% in each year thereafter. The results can be seen in Table 1 (a recreation of Table 4 in part two of [8]), and in Chart 1 (a duplicate of Chart 1 in part two of [8]). These estimated mortality rates are compared to the actual CDC mortality rates reported. As can be seen, the estimated rates fit the actual rates quite well.

Using the Frankfurt study, estimates were determined on progression rates from HIV infection to AIDS. Table 2 (a recreation of Table 5 in part two of [8]) shows estimated progression rates through the stages of the Frankfurt staging method. Using these estimations, Table 3 (a recreation of Table 8 in part two of [8]) shows progression from HIV infection through the stages to death for 100 lives over twenty-five years.

As is mentioned in the underwriting section of this paper, AIDS mortality rates have been shown to be well above the 500% standard mortality, which is usually the limit of coverage for an insurance company. Chart 2 (a duplication of Chart 4 in part two of [8]) diplays the estimated mortality from HIV infection at age 35. It is obviously seen that the estimations are well above what can reasonably be insured.

One of the most difficult parts of estimating the impact of AIDS is not only assembling a model to determine progression rates from HIV infection to AIDS and mortality rates of AIDS victims, but actually involves determining the numbers of HIV infected lives and how much this virus is going to spread. The unusual characteristics of this epidemic make it a difficult challange to find solutions to these problems in an accurate way. For example, under-reporting of AIDS cases may be causing problems in estimations of the HIV infected population. However, in realizing and addressing these problems, perhaps accurate estimations of the number of HIV-infected lives in society can be made.

Section 2

Insurance Concerns

A. Underwriting Procedures

Doctor Donald Chambers compares underwriting for the HIV disease to a game of golf [4, p. 1]. It looks simple, but actually all kinds of things can and do go wrong. He points out several issues that are of particular concern to the insurance industry.

The first issue he addressed was the illusion of a healthy carrier. In first predictions, scientists determined 5-19% of HIV+ patients would get AIDS. To the general public that left 80-95% healthy carriers, and it became difficult to convince the public that HIV+ patients were uninsurable. As estimates grew to 50-75% range of HIV+ patients getting AIDS, the public realized that HIV+ patients were not healthy. However, the insurance industry did not make a great start.

Another issue Chambers addressed was the public attitude toward risk classification. Results of a 1986 public attitude survey given by the American Council of Life Insurance with The Roper Organization showed that only 35% of those surveyed believed that risk classification was fair. That left two-thirds of the public that did not believe underwriting was fair. Results show a credibility problem. "How can we hope to influence governmental officials and convince them that we have a right and a need to do AIDS antibody testing when these

people first of all believe that HIV (AIDS virus) carriers are basically healthy and secondly they and their constituency don't really buy into what we do anyway?" [4, p. 4].

Confidentiality in testing was another issue of Chamber's paper. Protestors of HIV+ testing argued that testing is in violation of an individual's right to privacy and unfair discrimination is likely to be experienced. Insurance companies must provide a consent form, absolute confidentiality, and counseling in some areas due to pressure from legislation and protestors. The confidentiality aspect has been a frustrating one since it keeps public health officials from keeping track of the important dimensions of this disease and its spread. As long as testing is inadequate, the epidemic will continue to become worse.

The issues addressed by Chambers show some of the many challenges facing the insurance underwriters. However, in order to maintain a financially sound operation, testing must be performed. Anti-selection will result if a company does not prepare to minimize coverage of HIV+ lives, and this anti-selection would be costly.

As was seen in this paper previously, the mortality projections show that HIV+ lives cannot be covered by insurance companies. The mortality statistics show the mortality rate to be well above the 500% standard which is

the limit of substandard mortality that can be insured. Underwriting practices currently used to prevent writing business of HIV+ lives include adding questions to the applications and blood tests. The questions attempt to find if the applicant has been diagnosed with the virus, or if the applicant has been treated for ARC, AIDS, or infections associated with AIDS. The blood tests are used to screen the applicants. The ELISA/ELISA/Western Blot protocol is the test used by most insurance companies where allowed and has been found to be 99.9% accurate according to a Wisconsin epidemiologist's report [9, p. 10]. These practices permit the underwriting of AIDS similar to other serious diseases and protect insurers and policy holders. However, these are practices usually used for amounts over the company's testing limit.

There are several more areas insurance companies should be concerned about. Policies for amounts of insurance below the testing limit can be bought by HIV+ lives if not discovered by other underwriting procedures. The AIDS-related deaths from these patients are of great concern because they are often unanticipated, high costs. Also, some policy holders will become infected after the policy has been issued, and proper considerations should be made for these situations.

B. Legal Aspects

Several states have approved legislative constraints on testing for the AIDS virus antibody. Fear of discrimination and lack of confidentiality have caused states to act in order to protect the AIDS victim. "How explosive test results can be has been shown in Florida where three youngsters found infected with the AIDS virus - not the actual disease- were initially denied access to school and were burned out of their home by the fearful." [10, p. 14]. This family decided to leave their home in Florida. Lobbying pressures from high-risk groups, mainly male homosexuals, and situations similar to the one described above have caused the states to carefully examine testing procedures.

Several states have enacted laws prohibiting testing by insurance companies. California prohibits testing. The District of Columbia does this and more. New York and Massachusetts have been hostile to the testing procedures, and many more states are setting restrictions and guidelines for insurance companies. Wisconsin prohibited testing and then later reversed its decision.

After the District of Columbia approved its strict regulation on insurance testing, many companies left. As was seen before, the projections of mortality and progression into the disease, which implies infections and cancers, cause the HIV+ life to be uninsurable. Most companies would rather not do business in a state than not be allowed to detect

HIV+ lives. The American Council of Life Insurers and the Health Insurance Association of America found that 91% of the companies surveyed considered an AIDS-infected applicant uninsurable at any price [5, p. 12].

Insurance companies have the right to medical information to protect themselves from anti-selection and to protect the company's solvency. Questions about smoking, heart disease, and cancer are used on applications, and medical examinations are used for some policies by underwriters to properly pool risks. Rejecting HIV+ lives is legitimate. Unfortunately, the high expected mortality of HIV+ lives and the expected high costs of health care cause the HIV+ life to be uninsurable rather than simply priced higher or placed on restricted coverage as could happen with other underwriting factors.

Insurance companies provide contracts that are binding promises to provide benefits when and if the event insured for occurs. An insurance company must remain financially sound to provide these benefits no matter how far into the future this event may occur. States have set up regulations and procedures to ensure sound financial strength of companies, and in the light of the AIDS epidemic, states should allow insurance companies to adopt new practices to maintain their financial strength. "It is vital that state insurance departments, charged with the supervision of company practices

and solvency, play a contributing, rather than an adversarial role, as companies adopt practices which enhance their contractual obligations." [9, p. 3].

States currently are enacting AIDS-prevention measures. Illinois approved 10 anti-AIDS measures, including a required HIV testing on couples that wish to be married and to allow health officials to warn the sex partners of infected individuals [10, p. 14]. Also, a stiff criminal penalty was approved for release of confidential test results into the wrong hands. As for discrimination of HIV+ lives, Illinois is using laws already on the books.

Other states also are using existing laws to cover discrimination and enacting laws to protect the AIDS victim, but these laws have yet to be tested by the courts. There exists a fear that states with few cases of HIV infection may not protect those infected or may require testing without safeguarding from discrimination. Secretary of Health and Human Services Otis Bowen is against federal laws that would make discrimination of AIDS patients and breach of confidentiality federal crimes, but he added that he would back these measures if state laws weren't doing the job [10, p. 14].

C. Prevalence of HIV+ Insureds

Insurance companies use risk classification for three main reasons. "It should: (1) protect the insurance system's financial soundness, (2) be fair, and (3) permit economic incentives to operate and thus encourage wide-spread availability or coverage." [9, p. B-1]. This process is necessary to provide a strong financial company with equitable practices. Premiums are established with the help of probability, statistics, and forecasting. Care is taken to provide appropriate and fair prices for the risks involved.

Because of progression through AIDS and mortality projections, HIV+ lives have been found to be a very high risk group. In underwriting for this disease, great care must be taken to provide confidentiality and a lack of discrimination. Also, underwriting should not conflict with basic civil rights, as was discussed before. AIDS presents greater problems in these areas since the high risk groups for AIDS are a narrow segment of the population. Great care should be taken in testing for this disease.

In determining the impact AIDS is going to have on a company, two major components must be considered: HIV+ insureds in in-force business and the impact of taking on additional risks from new business. Analysis of claims experience to August 1987, suggests that the prevalence rate of HIV infection among

the insured population is about half that of the general population, with infection among group insureds higher than among individual insureds [8, p. 1]. The high risk groups, i.e. homosexuals and intravenous drug users, are groups that do not tend to buy large amounts of insurance. If the epidemic spreads into the heterosexual population in greater force, insurance companies will probably see a rise in the prevalence rate among insureds. In determining additional risks of new business, an estimation was made by Cowell and Hoskins that with no antibody testing, of 7.5 million new individual life policies written for ages 20-59 (critical ages for risk of AIDS) in 1987, 55,000 would be issued on HIV infected individuals. However, most states are allowing some form of testing for the AIDS virus. The impacts financially of these estimates will be discussed in the next section.

Each individual company should estimate its prevalence of HIV+ lives from its own business by using prevalence rate estimates from studies such as [8] and [17]. Companies should examine the geographical distribution of its business, the male and female distributions in these geographical regions, and the ages of individuals insured. Also, a company should examine AIDS death claims reported to its company and take care in identifying AIDS death claims since under-reporting could cause underestimates in projections. After examining these areas of its business, a company can make an estimate of its business affected by HIV infection, an estimate on its implications, and plans for covering the costs.

D. Financial Concerns

It is shocking enough for someone to be diagnosed with AIDS, but along with the diagnosis comes a devastating strain on a person's finances. Not only will AIDS patients die, but they may spend the rest of their life in poverty. The medical bills including home care, hospitalization, prescriptions, and physician bills amount to $100,000 a year or usually more. Also, AIDS patients that are too sick to work and friends and family members that leave work to take care of the AIDS patient take a drastic loss in income which presents even more financial strains.

After personal finances are drained, who pays? The financial burdens will hit everyone's life and pocketbook. According to Diane Harris in [13], the effects will be felt disproportionately on public hospitals vs. private facilities, Medicaid vs. commercial insurers, big cities vs. small towns, and state and local governments vs. federal agencies. Last year, it is estimated that $1.1 billion was spent to care for people with AIDS. The Public Health Service estimates the costs in 1991 to be about $16 billion. Unfortunately, these estimates are probably too low.

Currently 90% of all AIDS medical expenses are accounted for by hospital care [18,p. 153]. Of course, costs vary depending on the infection and/or cancer of the AIDS patient.

Dimentia, a central nervous disorder common in AIDS patients, and pneumocystic carinii pneumonia, a type of pneumonia common to AIDS patients, are manifestations with higher expenses than Kaposi's sarcoma, a type of cancer, and other AIDS infections.

The high cost of hospital care can be avoided slightly by the use of case management. This involves home care by visiting nurses and home health workers or treatment at hospices that are devoted to the care of the dying. According to an insurance company study, case management would cost one-twelfth as much as traditional hospital care and would provide a better quality of life for the AIDS patient [18, p. 153]. San Fransisco currently has an effective case management network mostly composed of volunteers serving meals and providing daily living products and care. Insurance companies may consider this area to lower costs.

Another area of high and increasing expense is medication. For example, AZT, a drug that slows the spread of the virus through the body, costs approximately $10,000 per annual dosage. However, the bill could rise to $24,000 if the bill includes expensive medical procedures that are often needed, such as blood transfusions to avoid the drug's side effects. The additional prolonged health care costs of a person surviving longer because of a drug also provide economic hardships.

AIDS claims in 1986 paid by insurance companies amounted to approximately 1% of total claims paid [13, p. 112]. The health, life, and disability claims are rising slowly but steadily. The average AIDS individual life claim in 1986 was estimated by Cowell and Hoskins to be $29,118 with the average rising to $31,903 in 1987 [8, part 1, p. 30]. Not only are the estimated average costs rising, but as was stated before, the estimate of HIV+ lives is rising, and therefore the estimate of AIDS deaths is rising. Insurers believe that what is to come does not rest in their favor.

Cowell and Hoskins estimate that of $2,115 billion of total individual insurance on males aged 20-59 in force on 1/1/1987, $20.6 billion was on HIV+ lives, and of $1,450 billion of group insurance on the same population, $13.0 billion was on HIV+ lives. Through the end of the century for the males aged 20-59, individual life is expected to have $30 billion of AIDS related claims and group insurance on the same population is expected to have over $20 billion of additional AIDS related claims. By the mid-1990's AIDS related deaths from existing business could reach 10% of the life insurance's total claims.

After estimating its prevalence of HIV+ lives, a company can find sources of funds for these unanticipated claims. One

such source could be a raise in premium rates. Health insurance premiums are expected to rise by 2% or more because of AIDS in 1990 and by 4% or more in 1992 in areas that permit testing [13, p. 116]. In places that do not allow testing, health premium rates could climb as much as 32% a year [13, p. 116]. Life insurance predictions for testing areas show premium raises of only 1% or 2%. In non-testing areas, the life insurance premium could rise from 10% to 25% [13 p. 116].

A company could use its management of dividends and other nonguaranteed elements to absorb some of the unexpected AIDS claim experience. These are areas insurance companies can generally change to accomodate expected experience, "It is essential that companies understand the present distribution by age of AIDS deaths, and that they demonstrate that anticipated changes in the levels of dividends or other nonguaranteed elements can actually be implemented without further disruptions to the company." [9 p. 10].

Other companies may decide to fund AIDS claims by strengthening the reserve or by using existing surplus. Actuarial backing would be needed here to properly account for this type of funding.

The financial impact of AIDS unfortunately will hit many industries and every individual. Hospital costs are

expected to rise because of the AIDS epidemic, and poorer quality care may result. Premiums in insurance will probably show increases, and employee benefit packages will probably have to adjust. Also, the federal and state governments are spending for care, treatment, and research in enormous amounts. AIDS is a traumatic disease not only in lives but also financially.

Section 4

Conclusion

AIDS has affected the public and insurance industry in very many ways. It is obvious from the projections that the effects could be devastating for an insurance company. If its business is concentrated in the age group between 20-59 and in high-risk geographical areas, the costs could be tremendous. It is necessary to make provisions for these costs. Almost every insurance company will be affected by AIDS claims.

Since AIDS has affected the public in a non-uniform manner, each insurance company should examine its own business to determine appropriate actions. For some companies the costs of testing may not be worth the expected claims experience. However, with the expected high costs of health care and mortality rates, it is expected that most insurance companies will choose to test for the antibody of the AIDS virus.

The AIDS epidemic is still a very current issue. There are several more publications expected in the near future, including Panjer's paper mentioned in the introduction. I am anxious to further my research by studying these publications.

One area I plan to study further is the financial impacts of the AIDS epidemic on life insurance companies. The effects will be updated consistently, and I plan to keep up with this information when it comes available. It will be interesting to see the experiences insurance companies actually do have and to learn of the reactions of these insurance companies.

I would encourage every person to become educated on AIDS. It definitely is a concern of our times and one which probably will affect each and every one of us. As I said in the introduction, I believe it will be hard to underestimate the effects AIDS will have on our society. Fortunately, many groups and industries are aware of this and are taking appropriate actions.

Section 4

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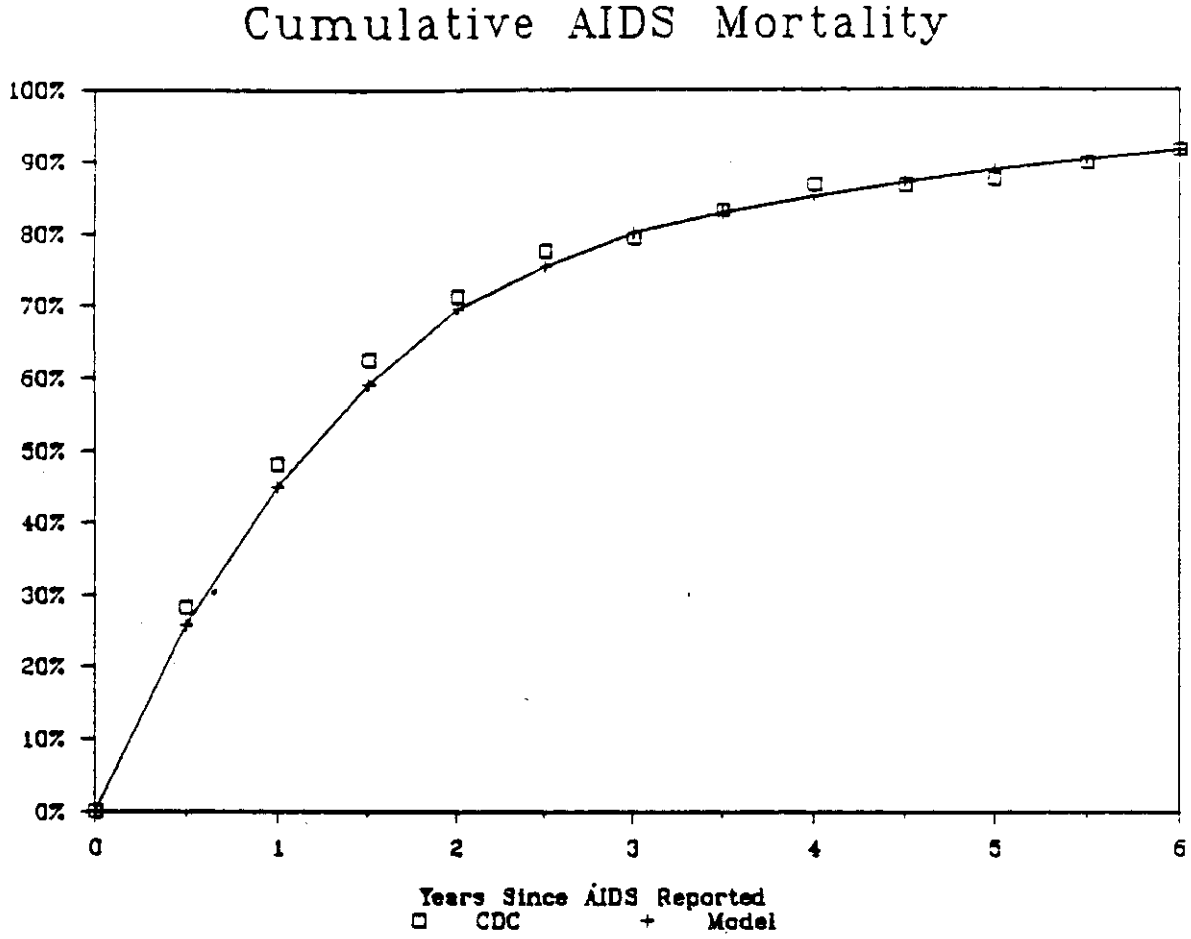
Section 5

Charts and Tables

Chart 1 *



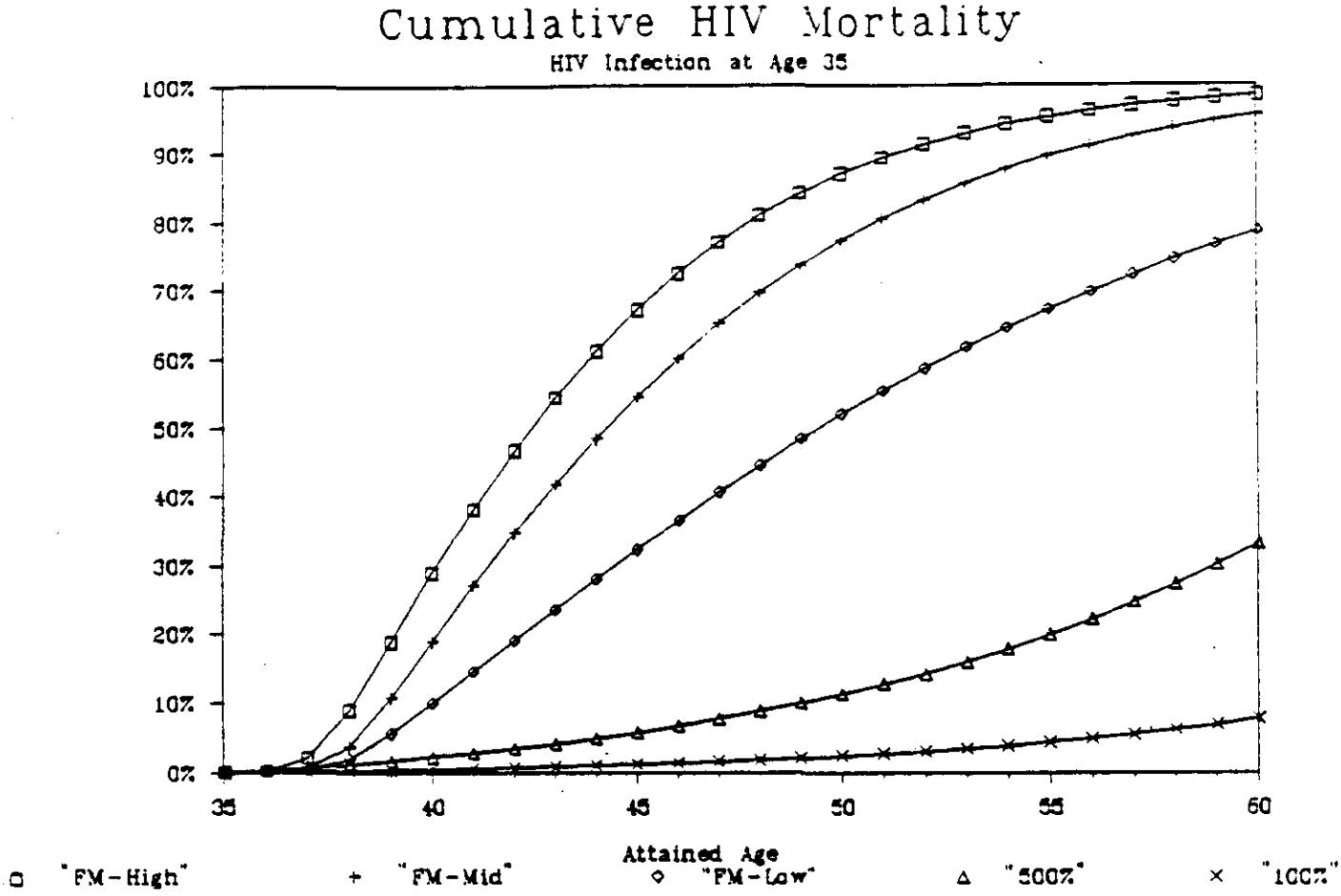
Notes:

□ **CDC Data are CDC AIDS Case Fatality Rates as of March 30, 1987.**

\+ **Model Data are Cumulative AIDS Mortality based on Annual AIDS Mortality Rates of 45%, 45%, 35%, and 25% thereafter.**

* This chart and notes are duplications from Chart 1 in part two of [8].

Chart 2 *



Scenario Descriptions:

□	"FM-High"	HIV Mortality 20% faster than Model HIV Mortality plus 100% Standard Mortality.
+	"FM-Mid"	Model HIV Mortality plus 100% Standard Mortality.
○	"FM-Low"	One Half of Model HIV Mortality plus 100% Standard Mortality.
△	"500%"	"Marginally Insurable Substandard Mortality" (500% Standard Mortality).
×	"100%"	"Standard Mortality" (1980 CSO Basic Male Non Smoker Age 35).

* This chart is a duplication of Chart 4 in part two of [8].

TABLE 1*

Modeled AIDS Mortality Rates Using Data from:

AIDS Weekly Surveillance Report
United States AIDS Program
Center for Infectious Diseases
Centers for Disease Control

March 30, 1987

Date of AIDS Diagnosis (by Half-Years)	Assumed Average Years Since AIDS Diagnosis	Actual Cumulative AIDS Mortality	Modeled Annual AIDS Mortality Rate	Modeled Cumulative AIDS Mortality
1986 July - Dec.	0.5	28%	45%	26%
1986 Jan. - June	1	48%	45%	45%
1985 July - Dec.	1.5	63%	45%	59%
1985 Jan. - June	2	71%	45%	70%
1984 July - Dec.	2.5	78%	35%	76%
1984 Jan. - June	3	80%	35%	80%
1983 July - Dec.	3.5	83%	25%	83%
1983 Jan. - June	4	87%	25%	85%
1982 July - Dec.	4.5	87%	25%	87%
1982 Jan. - June	5	88%	25%	89%
1981 July - Dec.	5.5	90%	25%	90%
1981 Jan. - June	6	92%	25%	92%

*This table is taken directly from Table 4 in part 2 of [8].

TABLE 2*

Periodic Progression Rates Used in the Model

Period	Stage 1a (At-Risk)	Stage 1b (HIV+)	Stage 2 a (LAS)	Stage 2 b (ARC)	Stage 3 (AIDS)
First Six Months	N/A	10%	15%	[5%]	[26%]
Second Six Months	N/A	50%	30%	[5%]	[26%]
First Year	N/A	[55%]	[40%]	10%	45%
Second Year	N/A	45%	35%	45%	45%
Third Year	N/A	20%	35%	15%	35%
Fourth and Subsequent Years	N/A	20%	20%	20%	25%

Notes:

Stage 1a progression rates (HIV Infection Rates) are not used in the Model.

Stage 1b, 21, and 2b progression rates are derived from Frankfurt Study data. These rates are graduated for the first three years and projected for the fourth and subsequent years.

Stage 3 progression rates (AIDS Mortality Rates) are derived from CDC data. These rates are graduated for the first six years and projected for the seventh and subsequent years.

[ ] indicate effective rates calculated from either First and Second Six Month rates, or from First Year rates.

* This table and notes are taken directly from Table 5 in part 2 of [8].

TABLE 3*

Result of Model Based on
Frankfurt Study HIV Progression Rates
and CDC AIDS Mortality Rates

Years Since HIV Infection	Progression From HIV Infection to Death (Percent Distribution By Stage)				
	Stage 1b (HIV+)	Stage 2a (LAS)	Stage 2b (ARC)	Stage 3 (AIDS)	Dead
0	100.0	0.0	0.0	0.0	0.0
0.5	90.0	9.2	0.8	0.0	0.0
1	45.0	48.2	6.6	0.2	0.0
1.5	33.4	47.5	18.3	0.7	0.1
2	24.8	44.2	28.3	2.2	0.5
2.5	22.1	37.3	33.9	5.1	1.5
3	19.8	31.8	36.0	8.8	3.6
3.5	17.7	27.5	36.5	11.6	6.7
4	15.8	24.6	35.9	13.3	10.4
4.5	14.2	22.5	34.6	14.3	14.4
5	12.7	20.7	33.2	14.8	18.6
6	10.1	17.7	30.6	14.9	26.7
7	8.1	15.0	28.0	14.6	34.2
8	6.5	12.7	25.3	14.2	41.3
9	5.2	10.8	22.7	18.3	47.9
10	4.2	9.1	20.2	12.6	54.0
11	3.3	7.6	17.9	11.7	59.5
12	2.7	6.4	15.7	10.7	64.6
13	2.1	5.3	13.7	9.7	69.1
14	1.7	4.5	12.0	8.7	73.2
15	1.4	3.7	10.4	7.8	76.8
16	1.1	3.1	9.0	6.9	79.9
17	0.9	2.6	7.7	6.1	82.7
18	0.7	2.1	6.6	5.4	85.2
19	0.6	1.8	5.7	4.7	87.3
20	0.4	1.5	4.9	4.1	89.1
21	0.4	1.2	4.1	3.6	90.7
22	0.3	1.0	3.5	3.1	92.1
23	0.2	0.8	3.0	2.7	93.3
24	0.2	0.7	2.5	2.3	94.3
25	0.1	0.6	2.1	2.0	95.2

*This table is taken directly from Table 8 in part 2 of [8].