The Actuarial Profession
making financial sense of the future

Life conference and exhibition 2010
James Shattock and Julie Hopkins

HIV

Yesterday's insurance pandemic?

7-9 November 2010

Programme

- History of a very modern epidemic
- Understanding the HIV virus and the importance of Highly Active Anti Retroviral Treatment (HAART)
- Developing the insurability of HIV+ lives in the UK market
- R6A Reserves – do we need them?

Early Emergence and Prognosis

- June 5 1981 - CDC recorded a cluster of PCP in 5 men in LA
- Soon followed by cases of Kaposi's Sarcoma
- July 1982 – named Acquired Immune Deficiency Syndrome (AIDS)
- 1983 - novel retrovirus discovered
- 1986 - named Human Immunodeficiency Virus (HIV)
- Early press

Early Emergence and Prognosis

- Prognosis after AIDS defining illness <12 months
- Transmission Routes
  - Unprotected sex
  - Blood or blood products
  - Intravenous drug use
  - Vertical transmission
- Global Toll

Global Summary

World Health Organization

UNAIDS

Global summary of the AIDS epidemic, 2008

Number of people living with HIV in 2008	Total	33.4 million [31.1 – 35.8 million]
	Adults	31.3 million [29.2 – 33.7 million]
	Women (aged 15 and above)	15.7 million [14.2 – 17.2 million]
	Children under 15 years	2.1 million [1.2 – 2.9 million]
People newly infected with HIV in 2008	Total	2.7 million [2.4 – 3.0 million]
	Adults	2.3 million [2.0 – 2.5 million]
	Children under 15 years	430 000 [240 000 – 610 000]
AIDS-related deaths in 2008	Total	2.0 million [1.7 – 2.4 million]
	Adults	1.7 million [1.4 – 2.1 million]
	Children under 15 years	280 000 [150 000 – 410 000]

Source: UNAIDS

Global Summary

World Health Organization

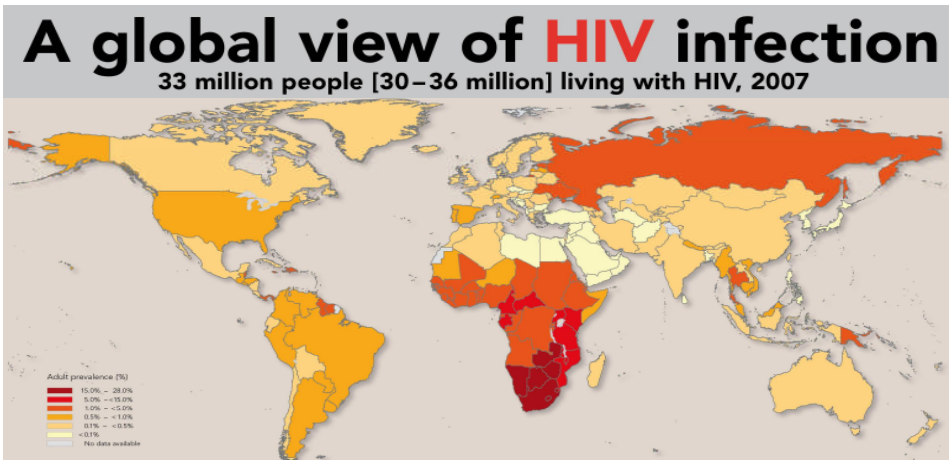
UNAIDS

Over 7400 new HIV infections a day in 2008

- More than 97% are in low- and middle-income countries
- About 1200 are in children under 15 years of age
- About 6200 are in adults aged 15 years and older, of whom:
  - almost 48% are among women
  - about 40% are among young people (15–24)

Source: UNAIDS

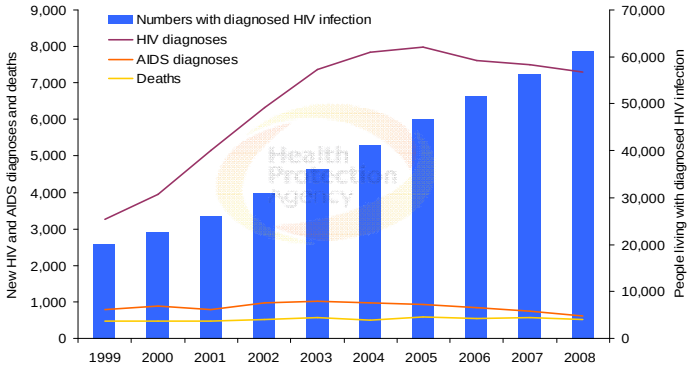
Global Summary



Source: UNAIDS

The Experience of the UK

New HIV and AIDS diagnoses, people living with diagnosed HIV, and deaths, among HIV-infected people, UK: 1999-2008

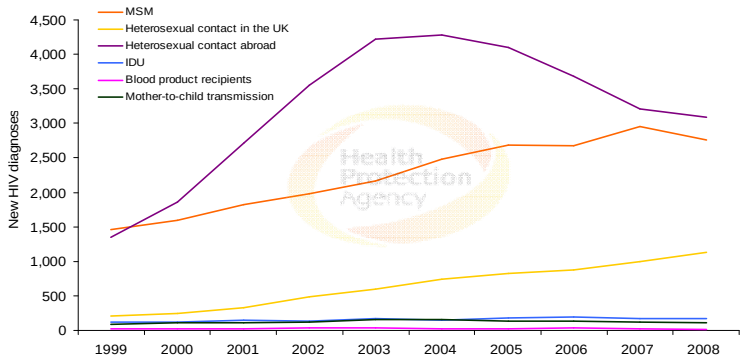


Source: HPA

MESH Department - Centre for Infections

The Experience of the UK

Number of new HIV diagnoses[1] by prevention group[2], UK: 1999-2008



[1] Numbers will rise as further reports are received, particularly for recent years
[2] Adjustments made for missing information relating to patient exposure

Source: HPA

MESH Department - Centre for Infections

The Reaction of the Life Assurance Industry

Early days

- Facing an unknown/uncertain risk
- Focus on certain types of professions
- Intrusive questions
- Actuaries AIDS Working Party
- Projections of many deaths

The Reaction of the Life Assurance Industry

More recent years

- HIV blood testing limits set at between £600k to £1million
- Applicants who have visited a high risk area will be tested
- Accidental/Occupational/Traumatic HIV named as a condition in CI
- HIV exclusions less common in disability cover
- ABI HIV Statement Of Best Practice

ABI Statement of Best Practice

- A code of practice on how the insurance industry deals with the issues surrounding HIV

5 key principles

- Underwriting approach
- Collection of information
- Use of information
- Accuracy of information
- Company policy on HIV and Underwriting

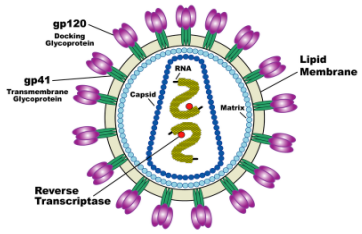
Underwriting Questions Today

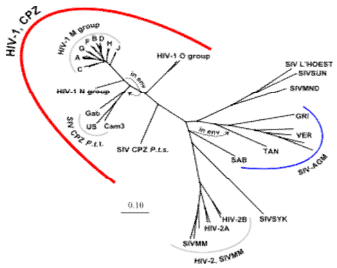
- “Have you ever tested positive for HIV, hepatitis B, or hepatitis C, or are you awaiting the results of such a test?
  - Note: If the result is negative, the fact of having an HIV test will not, of itself, have any effect on your acceptance terms for insurance
- “Within the last 5 years have you been exposed to the risk of HIV infection?”
  - “(this can be caught through unsafe sex, intravenous drug abuse, or blood transfusions or surgery undertaken outside the EU)”

Underwriting Questions Today

- “Within the last 5 years have you tested positive or been treated for any disease, which was transmitted sexually?”
- “Have you ever injected non-prescription drugs?”
- "Within the last 5 years have you lived or frequently travelled to an area which has a high incidence of HIV infection?"

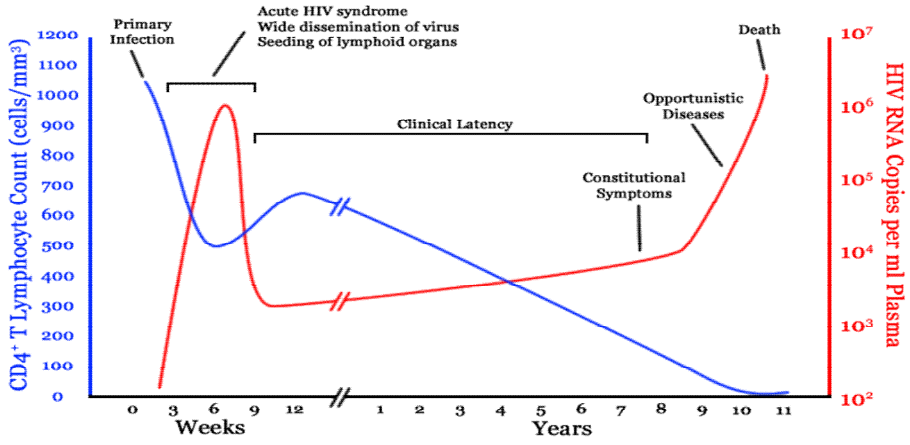
The Virus





Source: NIAID
Source: Theoretical Biology and Biophysics Group, Los Alamos National Laboratory

Effect on the Immune System



Source: Based on Figure 1 in Pantaleo, G et al (February 1993). "New concepts in the immunopathogenesis of human immunodeficiency virus infection". *New England Journal of Medicine* **328** (5).

AIDS Defining Illness

- Infected with HIV and present with one of the following:
  - A CD4+ T-cell count below 200 cells/µl (or a CD4+ T-cell percentage of total lymphocytes of less than 14%)
  - or he/she has one of the following defining illnesses:
    - Candidiasis of bronchi, trachea, or lungs ; Candidiasis esophageal ;Cervical cancer (invasive) ; Coccidioidomycosis, disseminated or extrapulmonary ;Cryptococcosis, extrapulmonary ; Cryptosporidiosis, chronic intestinal for longer than 1 month ; Cytomegalovirus disease (other than liver, spleen or lymph nodes) ; Encephalopathy (HIV-related) ; Herpes simplex: chronic ulcer(s) (for more than 1 month) ; or bronchitis, pneumonitis, or esophagitis ;Histoplasmosis, disseminated or extrapulmonary ; Isosporiasis, chronic intestinal (for more than 1 month) ;Kaposi's sarcoma ; Lymphoma Burkitt's, immunoblastic or primary brain ; Mycobacterium avium complex ; Mycobacterium, other species, disseminated or extrapulmonary ; Pneumocystis carinii pneumonia ; Pneumonia (recurrent) ; Progressive multifocal leukoencephalopathy ;Salmonella septicemia (recurrent) ; Toxoplasmosis of the brain ; Tuberculosis ; Wasting syndrome due to HIV

Medical Developments

- Search for a vaccine has been elusive
- Similar story for a cure

BUT!

- Highly Active Anti Retroviral Treatment (HAART) has seen success
  - It is NOT a cure
  - It can have serious side effects
  - Does not work for all patients

How HAART Works

- Works by repressing the virus and stopping it from replicating
- Allowing the immune system to recover
- Viral load <50 copies/ml – virtually undetectable
- Long term side effects unknown, risk of further viral mutations

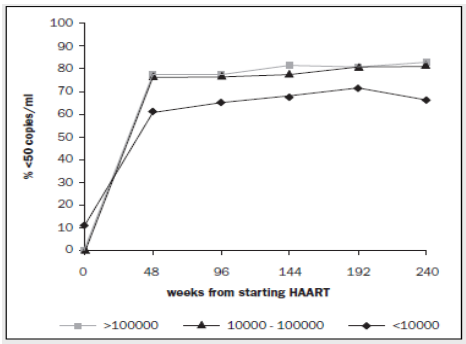
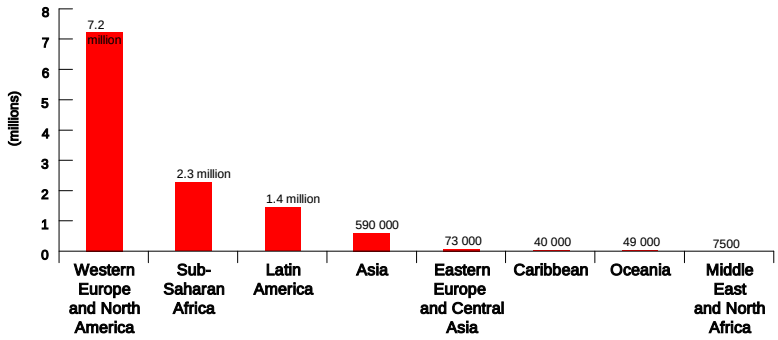


Figure 10.5: Percentage of patients with HIV-RNA below 50 copies/ml in patients tested with a sensitive assay according to baseline HIV-RNA (copies/ml).

Source: Dutch HIV Monitoring Foundation 2005

Impact of HAART

Estimated number of Life-years added due to antiretroviral therapy, by region, 1996–2008

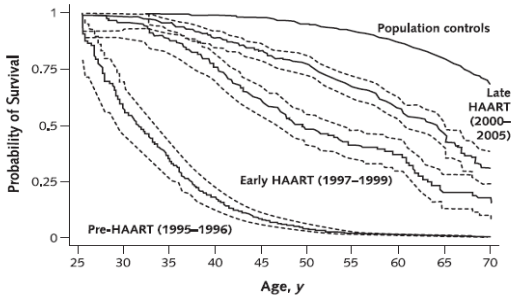


Source: UNAIDS

Figure VII

Recent Research

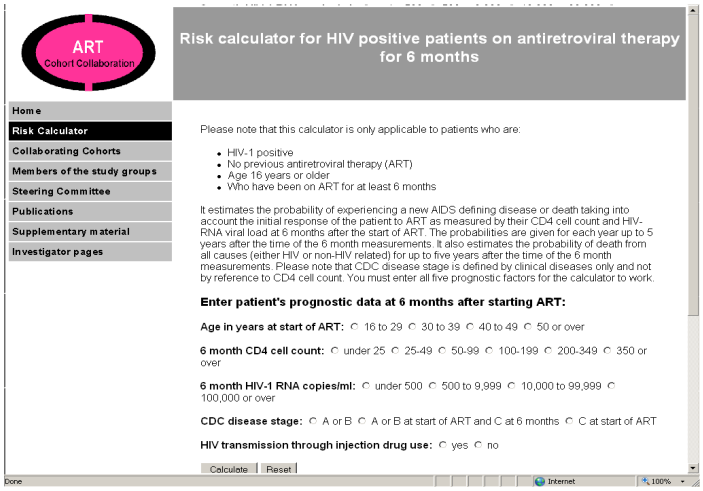
Figure. **Survival from age 25 years.**



Cumulative survival curve for HIV-infected persons (without hepatitis C coinfection) and persons from the general population. Persons with HIV infection are divided into 3 calendar periods of observation. Dashed lines indicate 95% CIs. HIV = human immunodeficiency virus; HAART = highly active antiretroviral therapy.

Source: AIM – Survival of Persons with and without HIV Infection in Denmark 1995-2005, Lohse et al 2007

ART Cohort Models



Source: www.art-cohort-collaboration.org/

Developing Insurance

- Consider medical research papers and data
- South African and Dutch market initiatives
- Further stratify risk by prognostic variables
- Use actuarial and insurance medicine based methodology to derive insurance based loadings….
- …whilst making sure clinical evidence and factors will meet underwriting purposes
- Sign off

Developing Insurance

- Build a calculator to derive loadings
- Design additional HIV specific questionnaires for client and HIV specialist
- No change to the general application
- All processes are the same

Risk Mitigation

Offering Terms

- We can offer terms to HIV+ individuals who
  - Shown good response to HAART after 24 weeks that is continuing
  - Viral load undetectable (<50 copies/ml)
  - No significant co morbidities (Hepatitis B and C)
  - Not transmitted by IDU
  - History of good compliance
- Policy up to 10 years duration, and Sum Assured £250,000
- Flat loadings from 3 mille upwards

Going to Market

- HLR UK came out publically and announced that we will take certain HIV cases
- Happy to consider any cases for any current client
- In partnership with one client we have developed a bespoke offering that we Reinsure
- Political lobby groups and charities see it as a positive development to offer insurance

Underwriting Cases Seen to Date

- Wide variety of applicants
  - Gender
  - Ages
  - Terms
  - Occupations
- Occasional underwriting issues
  - Not yet on HAART treatment
  - With serious co morbidities
- But terms being offered and accepted by those meeting criteria
- Good level of medical evidence submitted by HIV physicians

Example Case Study 1

- Male aged 27
- Applies for £100k term policy for 10 years
- Diagnosed 3 years ago
- On HAART treatment for 48 weeks
- Good response - CD4 count > 500 cells/mm^3
- Viral load suppressed to undetectable (< 50 copies/ml)
- Hep C and B negative – no other co morbidities

Can offer 3.5 per mille on standard rates

Example Case Study 2

- Female aged 36
- Applies for £75k term policy for 10 years
- Diagnosed 6 years ago
- On HAART treatment for 4 years
- CD4 count gradually increasing – currently at 400 cells/mm^3
- Viral load suppressed to undetectable (< 50 copies/ml)
- Hep C and B negative – smoker with mild asthma

Can offer 7 per mille on smoker rates

The Future

- Update model and terms offered as more data released
- Possible mutations and drug resistance
- Ongoing monitoring of portfolio
  - Both applicants and written policies
- Change in treatment protocols
  - Starting HAART treatment sooner

Early Days ……..what would you do?

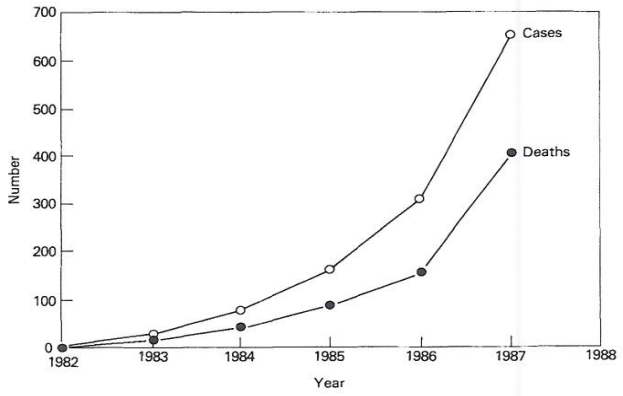


Figure 1. Reported cases of AIDS and deaths from AIDS in the U.K. 1982–87.

Source: JIA 115 1988

AIDS Reserves

- AIDS BULLETIN No 1,2,3 1987-88
  - Projections A,F
- JIA 115, 1988 Daykin et al
  - The impact of HIV infection and AIDS on Insurance in the United Kingdom
- AIDS BULLETIN No 4 March 1989
  - Projections P to V
- JIA 117 1990, Daykin et al
  - The epidemiology of HIV infection and AIDS
- AIDS BULLETIN No 5 March 1991
  - Projections R6A, R6B, R6C

AIDS Reserves - A to F

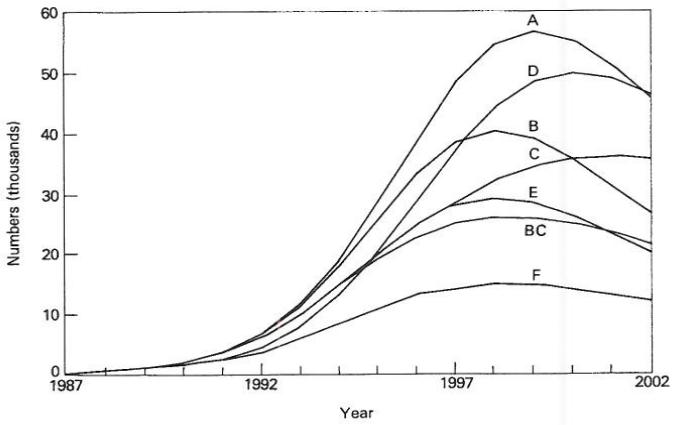


Figure 8. Projected numbers of deaths from AIDS each year. Projections A–F.

Source: JIA 115 1988

Early Days…….what the Underwriters did!

- Underwriters control entry to insured pool
- Asked a lot of intrusive questions
- Life style loadings of 3 to 5 per mille
- Prevented a shock to the insured pool

AIDS Reserves Today in UK

- AIDS reserves have been reduced or removed completely
- Now typically 1/3 R6A – sometimes modified
- 1/3 R6A approximates to 2500 AIDS deaths in UK over 2009
- Actual number of deaths is flat at 500-700 since year 2000
- Unless modified/peak R6A used – AIDS deaths assumed to be tailing off over time

R6A Reserves Today in UK - Do we need them?

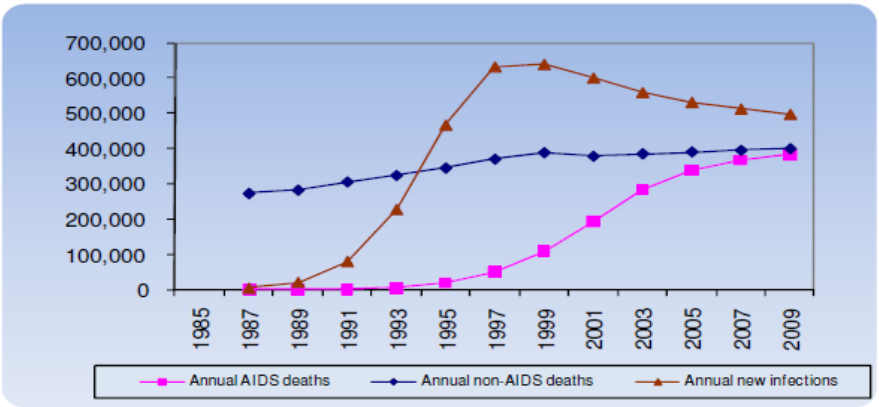
NO!

- Experience has been very different to AIDS reserves
  - Deaths constant at around 500-700 per annum
  - Medical advances
  - Mismatch between population deaths and with insured portfolio
  - Underwriting
- Reserving basis should have overall margins
- Overall, when mortality is improving, why explicitly target one relatively low incidence chronic condition?

Other Things on a Life Actuary's Mind

It Could Have Been Very Different!

Figure 1: AIDS deaths, non-AIDS deaths and annual new infections, South Africa, 1985-2009



Source: ASSA model, 2003

A Hyperendemic HIV Problem

- South Africa has more than 15% of the population aged 15-49 living with HIV
- 5.7 million people living with HIV
  - > 3 million of these are women aged 15 and over
  - 280,000 are children ages 0-14 years
  - National overall HIV prevalence amongst pregnant women served in public health clinics was 29.3%
- Primarily transmitted heterosexually and vertically
- SA has the world's largest population of people living with HIV

Source: 2010 UNGASS Country Progress Report

Summary

- Data now exists to support offering limited Term Assurance for certain HIV+ subset
- Cases seen in practice at Underwriting are definitely in this subset
- HIV is a global pandemic that has lead to death and misery for millions
- The UK has escaped relatively lightly
- R6A reserves are out of date. Why do some companies still hold them?

Questions or comments?