

PANDEMICS OLD AND NEW – TB AND AIDS IN AFRICA

C. F. HEYNS

Department of Urology, Faculty of Health Sciences, University of Stellenbosch and Tygerberg Hospital, Tygerberg, South Africa

No man is an *Island*, intire of it selfe ...
any mans *death* diminishes *me*, because I am involved in *Mankind* ...
And therefore never send to know for whom the bell tolls; It tolls for *thee*

John Donne (1573-1631)

The topic of this paper concerns the ancient pandemic of tuberculosis (TB), and the new pandemic of acquired immune deficiency syndrome (AIDS), and their impact on Africa. The paper will focus on the socio-economic aspects of the enormous challenge which is facing the practice of Urology, and indeed of all Medicine, in many countries of Africa today.

Tuberculosis is an ancient disease, which dates from the time of the Egyptian pharaohs more than four thousand years ago. Egyptian mummies from 2400 BC show pathological signs of spinal TB. Around 460 BC Hippocrates noted that phthisis or consumption, as TB was then called, was the most widespread disease of the time, and was almost always fatal.

Because of this high mortality, Hippocrates wrote something which no doctor would dare to write today: he advised his colleagues against visiting patients in the late stages of TB, because their inevitable death might damage the reputation of the doctor.

The earliest reference to the infectious nature of TB dates from 1699, when the Republic of Lucca issued an edict which stated that "human health should no longer be endangered by objects remaining after the death of a consumptive. The names of the deceased should be reported to the authorities, and measures undertaken for disinfection."

In 1720 the physician Benjamin Marten was the first to conjecture, in his publication, *A New Theory of Consumption*, that TB could be

caused by "wonderfully minute living creatures" that are spread to healthy persons by contact with infected patients.

From the 1850's onwards it was recognized that TB was potentially curable. However, the means of treatment were modest, and consisted of improving social and sanitary conditions, and ensuring adequate nutrition, while the isolation of patients in sanatoria served to remove the source of infection from the general population.

In 1882 Robert Koch discovered a staining technique for *Mycobacterium tuberculosis* and managed to demonstrate the organism causing TB under a microscope, thereby identifying the insidious enemy for the first time. The bacteriologists Calmette and Guerin used specific culture media to lower the virulence of the bovine TB bacterium, creating the basis for the BCG vaccine against TB.

However, it was more than 60 years after Koch's discovery before Waksman and associates in 1943 demonstrated that TB could be effectively cured with chemotherapy in the form of streptomycin, purified from the fungus *Streptomyces griseus*. On November 20, 1944 streptomycin was administered for the first time to a critically ill TB patient.

Many famous and creative individuals were among the untold millions of lives claimed by TB over the course of many centuries prior to the discovery of effective chemotherapy (Table 1). Despite the initial effectiveness of strepto-

Table 1: Some of the famous and creative individuals who were among the untold millions of lives claimed by TB

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- Anton Checkov
 - Emily Brontë
 - Frédéric Chopin
 - John Keats
 - D.H. Lawrence
 - George Orwell
 - Niccolo Paganini
 - Edgar Allan Poe
 - Jean Jacques Rousseau
 - Sir Walter Scott
 - Robert Louis Stevenson
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mycin alone, the rapid emergence of resistant strains soon made it clear that a combination of at least three and sometimes four drugs would be required to effectively combat the organism causing TB. Largely due to effective medical treatment, TB has become a rare disease in affluent First World countries. However, this is not the case in many Third World countries.

Another ancient and endemic disease which has at times flared up into large scale epidemics is the plague, which is caused by an organism carried by rat fleas. In the 6th century the plague killed an estimated 100 million people in the Middle East, Europe and Asia. In the 14th century an epidemic, which became known as the Black Death, killed one-fourth to one-half of the population of Europe, about 75 million people. The Black Death spread within a period of only 7 years (1346 to 1353) from an original focus in the Crimea, through all the countries of the Middle East, North Africa and all of Europe. Only a few small areas were not afflicted.

In the 15th century an epidemic of a previously obscure but virulent disease caused great destruction of life all over Europe. In 1530 the Italian physician Fracastoro recognized it as sexually transmitted. He wrote a poem entitled "Syphilis, or the French disease", about the adventures of a rich young shepherd, Syphilus, who insulted Apollo. The god in anger inflicted on him a loathsome disease,

which Fracastoro graphically described in Latin verses. Human nature being what it is, it is not surprising that countries tended to blame the origin of the disease on their neighbours. In Italy it was known as the "French disease", in France it was known as the "Spanish disorder".

A great controversy has raged about the question whether syphilis had existed in Europe in localized forms before the epidemic in the 15th century, or whether it was brought back from the New World by the sailors who had returned with Columbus after 1493. There appears to be some evidence that the organism causing syphilis originated in tropical Africa and migrated with man to Asia and over the Bering Strait to the Americas, mutating into the virulent form which ravaged Europe for many centuries.

Effective treatment for syphilis (caused by *treponema pallidum*) became available in the form of penicillin, discovered by Fleming in 1929, and produced in therapeutic form by Chain and Florey in 1938. Effective antibiotic treatment for the plague (caused by *yersinia pestis*) became available in 1943 and 1947, respectively, in the form of streptomycin and chloramphenicol. Therefore, the spectre of pandemics caused by these organisms has virtually disappeared.

However, in the 1980s a new pandemic began to make its presence felt. Once again, great controversy has raged about the origin of the organism, the human immunodeficiency virus (HIV). The controversy has largely been fueled by political and economic sensitivities. However, most virologists accept the theory that the different strains of HIV originated among primates in the African rain forest and were transmitted to man via blood contamination from hunted animals.

In the 1990s there has been a dramatic spread of the virus in man. For example, the HIV infection rate among pregnant women in South Africa has risen from less than 1% in 1990 to almost 25% in 2001, thus a 25 fold increase in only 12 years.

The HIV prevalence rate has risen the sharpest in Africa south of the Sahara, whereas the rate has remained constant and very low in North Africa, with increasing prevalence rates in West, Central, and East Africa, including the eastern Horn of Africa region.



Total: 42 million

Fig. 1: Total number of people living with HIV/AIDS at the end of 2002 (data provided by the World Health Organization)

The total number of people living with HIV/AIDS at the end of 2002 has been estimated at 42 million. Of this number, the vast majority (70%) is living in Sub-Saharan Africa, although no region of the world has remained unaffected by the new pandemic (Fig. 1).

Of the total number of 3.1 million people who died from HIV/AIDS in 2002, 2.4 million (77%) were from Sub-Saharan Africa (Fig. 2). This indicates that the mortality from HIV/AIDS in this region is substantially higher than in other parts of the world.

Since the start of the epidemic, HIV has infected almost 58 million people. AIDS has thus far cost the lives of nearly 22 million people (38% of those infected). These figures may appear unimpressive compared to the plague, which killed 100 million people in the 6th century and 75 million people in the 14th century. However, HIV infection is a major threat in the developing world, where 95% of new infections occur. AIDS is now the leading cause of death

in Africa, and the 4th leading cause of death worldwide.

There was no TB among indigenous South African people before the European settlers arrived. Therefore, the black population had no resistance or immunity to TB. As in Europe, with industrialization and the development of mining, came urbanization and the practice of migrant labor, which led to an increased dissemination of TB. Urban overcrowding, poor housing and sanitation, poverty, malnutrition and alcoholism contributed to the spread of TB. However, until recently the disease was relatively well controlled in most countries. Today, TB incidence rates are highest in sub-Saharan Africa, whereas a high incidence also occurs in other parts of Africa, Asia and South America (Fig. 3).

HIV is the most powerful known risk factor for reactivation of latent TB infection. HIV affected individuals have a 30 times higher probability of acquiring TB than non-HIV infected



Fig. 2: Total number of deaths from HIV/AIDS during 2002 (data provided by World Health Organization)

people. This synergy between a disease of antiquity and a novel human pathogen has led to a resurgence of TB, especially in developing countries. Up to 70% of TB patients are infected with HIV, and up to 50% of people living with HIV can be expected to develop TB. Currently, TB is the commonest cause of HIV related death in many HIV affected areas.

The mortality due to TB is significantly increased in patients who are also HIV infected, with case fatality rates which have increased from 5% to 20% in some countries. Conversely, TB infection enhances HIV replication and may accelerate the natural progression of HIV infection to full-blown AIDS

TB treatment must be supervised to ensure compliance (**DOTS** - **D**irect **O**bserved **T**herapy, **S**hort-course). Treatment is for 6 months to ensure sterilization of the lesion. Combinations of at least 3 anti-tuberculous agents are used. It costs as little as US \$10-15 per patient. However, despite these low costs per patient, it is estimated that the total cost of TB control in

the 22 countries with the highest burden of TB infection is around US \$1 billion per year.

With regard to combating virus infection diseases, there are a few spectacular success stories. Smallpox has been virtually eradicated. In 1967 there were 10 million cases recorded, but a vigorous world-wide vaccination campaign led to the virtual disappearance of smallpox within less than 10 years. Poliomyelitis was a much dreaded disease prior to the development of an effective vaccine in the 1950s, and polio has now been almost totally eradicated.

However, the HI virus is an immensely complex organism, and development of a vaccine is not expected to be quick or easy. In addition, there are many obstacles in the fight against AIDS. These include entrenched socio-cultural attitudes to sexual practices, such as promiscuity and condom use. There is still widespread denial of the problem, even at government level. There is resistance to HIV testing and notification of the disease, due to

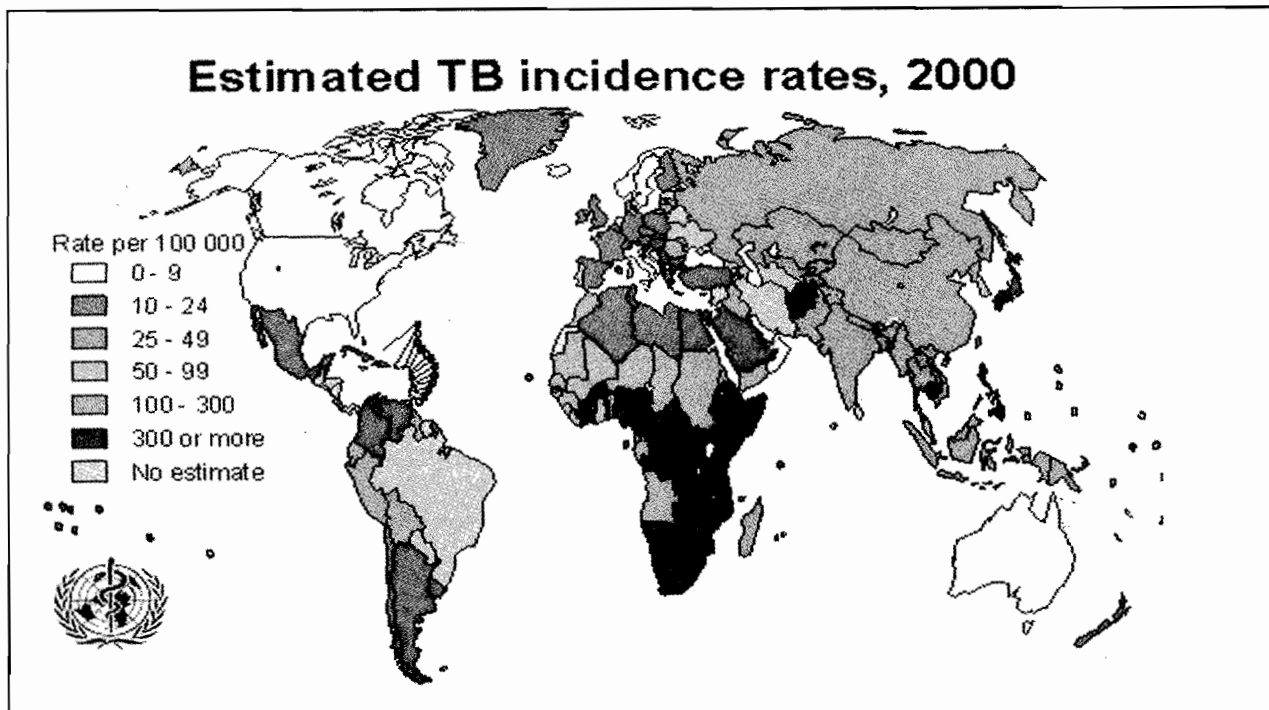


Fig. 3: TB incidence rates in 2000 (data provided by World Health Organization)

the fear of stigmatization. With regard to anti-retroviral medication, there are problems with high costs, limited efficacy and possible toxicity.

The United Nations is co-ordinating efforts for the prevention of HIV infection and care of AIDS patients. The estimated costs are astronomical. The cost of effective prevention and care programs in low- and middle-income countries will probably escalate from around \$3 billion in 2002 to about \$15 billion per year from 2007 to 2017. Up to 80% of the resources needed in the developing world will have to come from international sources.

Another international effort is the Global Fund to fight AIDS, TB and Malaria, which was launched at the beginning of 2002. This is a new approach that emphasized national ownership and country-led activities, and total pledges to the Fund stood at US \$2.1 billion in October 2002. There are some encouraging signs already, indicating a decline in HIV infec-

tion rates in some countries. Also, AIDS vaccine initiatives are continuing internationally and locally in countries such as South Africa, through its SAAVI (South African AIDS Vaccine Initiative) program.

Although our planet has become in some respects a global village, in other respects it is still very much a matter of every man for himself. The economic burden of the AIDS and TB pandemics in developing countries, and especially in sub-Saharan Africa, is likely to have a major impact on medical and urological care. However, to survive in Africa, and in the world, one needs to be an optimist. It may be true that, in the fight against HIV/AIDS, a miracle is needed. But it has also been said that he who does not believe in miracles, is not a realist.

In the poem quoted at the beginning of this paper, the English metaphysical poet, John Donne, makes the point that no man is an island, entirely self-sufficient; therefore we can not live in isolation. Donne uses the image of a

funeral bell ringing for the dead, and says that you should never send a messenger to ask for whom the bell tolls, because it tolls for you yourself. Although today the funeral bell of the TB/AIDS pandemic is ringing loudest in Africa, the rest of the world should not turn a deaf ear.

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All correspondence to be sent to:

Professor C.F. Heyns
Department of Urology
P.O. Box 19063
Tygerberg 7505
South Africa

E-mail: cfh2@sun.ac.za