HIV Origins

September 20, 2010 By Joseph Sonnabend, MD

Unsafe medical practices in equatorial Africa fifty to eighty years ago probably helped to set in motion an epidemic of hepatitis C infection.

Two articles in the current issue of Clinical Infectious Diseases show that injections for the treatment and prevention of endemic diseases highly prevalent in parts of the Central African Republic and Cameroon were probably responsible for the spread of the hepatitis C virus and of human T lymphotropic virus 1 (HTLV-1).

Human African Trypanosomiasis more familiarly known as sleeping sickness is spread by the bite of the tsetse fly and is almost invariably fatal if untreated. It is a horrible disease. This video will give some idea of its impact[1].

Sleeping sickness was highly prevalent in south-eastern regions of the Central African Republic.

It was treated with intramuscular injections of pentamidine after about 1946 until 1950. Before 1946, subcutaneous or intravenous injections of another drug, orsanine, had been used. If there was central nervous system involvement treatment consisted of 12 weekly intravenous injections of yet another drug, tryparsamide. Injections of pentamidine were also used at a population level to prevent infection.

In Cameroon, the risk of acquiring hepatitis C was associated with the intravenous administration of quinine to treat malaria. Other possibilities for transmission 50-80 years ago include intravenous injections to treat syphilis or yaws, and blood transfusions.

The relevance to HIV is that the rural areas in the south east of the Central African Republic and the southern Cameroon are close to the sites where SIV_{cpz} has been isolated from chimpanzees. This virus is believed to be the precursor of HIV-1.

The HIV-1 and HIV-2 epidemics originated from cross species jumps from two different non-human primates. Attempts have been made, in the case of HIV-1, to pinpoint in time when the fateful transfer occurred, as if it were a unique event, rather than something that has probably happened countless times. Cross species transmission of some viruses may in fact be quite efficient. Simian

foamy virus (SFV) causes absolutely no ill effects in humans, but about 25% of people reporting a monkey bite or scratch in Cameroon have evidence of SFV infection.

Man and other primates have been living in proximity in Africa for millennia, so cross species transfer of viruses will have been frequent.

The "why now" question about the HIV epidemic is not about when the species jump occurred, but about when conditions were such that widespread human to human infection became likely enough to start an epidemic. It's just not plausible that two unique events, the jump of HIV-1 and HIV-2, each from two different primate species occurred in the same time frame.

Conditions that enabled the widespread transmission of HIV between humans probably resulted from a multiplicity of factors coming together at the same time. But part of the puzzle may be explained by unsafe medical practices 50 to 80 years ago in regions of Africa where SIV_{cpz} has been found. What may have been fateful was not a unique monkey to human transmission but that something that happens repeatedly was occurring at a particular time and place where further spread between humans was facilitated to a greater or lesser extent by unsafe medical practices.

In previous posts about the pathogenesis of HIV disease I have frequently pointed out the relevance of some endemic infections in Africa to HIV disease. Some of these infections, by contributing to immune activation will enhance HIV replication, and it seems reasonable that infectivity will increase because of greater viral loads. So this is yet an additional factor favouring the spread of HIV. The regions of the Central African Republic and Cameroon mentioned above carry a particularly heavy burden of endemic infections associated with immune activation.

Are unsafe medical practices a thing of the past?

Do we no longer need to be concerned that they may contribute to the spread of HIV infection?

Simon Collery works in development in Kenya. He is in a position to address the issue of the safety of medical practices from the field.

The following was written by Simon Collery:

I have been studying the spread and decline of HIV through Kenya for seven years, using any relevant material I can find, whether it be medical, scientific, economic, geographical or administrative. Part of the picture I have of the epidemic in Kenya is drawn from this research.

Another part of the picture derives from living and working in Kenya, and also some time in Tanzania and Uganda, for three years, talking with people, observing, writing, discussing and reasoning.

My tentative conclusions are that, despite being extremely poor, having a very high disease burden, low levels of education, terrible healthcare, crumbling infrastructure, long periods of food insecurity and many other adverse conditions, Kenyans are much like people from other countries. That may not sound like a very profound conclusion until you compare it to assumptions that are frequently made that Africans have a great deal of sex much of it being unsafe.

On the other hand when it comes to health care facilities Kenyans are exposed to conditions that are vastly different to those experienced by people living in the developed world.

Let’s look at Kenya in more detail. Overall prevalence of HIV infection is about 7%, but in North Eastern Province it’s less than 1%, about a third of the level found in Washington DC. But in the poorest province, the one with the highest rates of poverty, the lowest levels of education, the least access to health services and some of the highest rates of ’unsafe’ sexual behaviour, you also find the lowest prevalence of HIV.

In contrast, the highest rates of HIV are found among one tribe, the Luo, many of whom depend on the fast declining fishing industry around Lake Victoria. Prevalence there is 20% or higher, closer to rates found in the highest prevalence countries in the world, such as Swaziland or Lesotho.

Many aspects of sexual behaviour in the Luo area are similar to what you’d find in other areas, in Kenya and elsewhere.

HIV is not just about sex. Therefore, reducing HIV transmission should consist of more than education to reduce sexual transmission.

When it comes to non-sexual transmission of HIV, such as transmission through unsafe injections,

UNAIDS does not say very much, merely referring to their statement that 70 -90% of transmissions result from heterosexual sex.

How did they work out that HIV transmission from unsafe injections in Kenya probably only contribute between 0.6 and 2% of infections? The question is pertinent considering the same report that includes this table, admits that there is very little information available on injection safety and that it is difficult to get baselines.

The World Health Organization gives a slightly different story . They estimate that, worldwide, up to 40% of injections are unsafe, because needles and syringes are reused without sterilization. In some countries this figure can be as high as 70%. They also estimate that about 70% of injections are unnecessary or the drug could be administered orally. These phenomena give rise to over one third of hepatitis B and C infections and between 2% and 9% of HIV infections.

Where does Kenya fit into this picture? As UNAIDS admit, there's not much data. But there is a document called the Service Provision Assessment which looks at conditions in various kinds of health facility, such as hospitals, clinics and pharmacies.

A few samples from this document may suffice to illustrate Kenya's capacity to prevent HIV transmission through unsafe injections and other healthcare practices: Between 10 and 15% of facilities don't have adequate supplies of needles, syringes or latex gloves; between 55 and 70% don't have running water or soap; many don't have facilities for disposing of contaminated equipment or supplies of disinfectant; less than half have guidelines for infection prevention and less than 10% have guidelines for sterilization.

Although this document dates from 2004, we don't know if there has been any change.

Here is part of a table from the report:

There's little doubt that unsafe health care is still a problem in Kenya and other high HIV prevalence countries. What's not clear is how big a problem it is. Because, despite admitting that they don't have the sort of data on unsafe health care that would allow an estimate to be made, UNAIDS and the WHO have failed to investigate or to carry out the research required.

While sexual transmission may be the predominant mode of HIV transmission, non-sexual transmission is significant and neglected. What is inescapable is that, if we truly care about the health of populations, the conditions of health care facilities in many parts of the world are completely unacceptable, as shown in the WHO report above. These conditions pose a danger of acquiring not only HIV, but of many other infectious diseases.

1: This video was made in the Democratic Republic of Congo where in some regions the prevalence of trypanosomiasis exceeds that of HIV. Although HIV replication can be enhanced by many endemic infections In Africa, trypanosomiasis may be one that could exert an inhibitory effect.
