

STD CONTROL AS A COMPONENT OF HIV CONTROL STRATEGIES

Anne Buvé

Introduction

Nearly two decades after the first cases of AIDS were identified the HIV/AIDS pandemic remains one of the biggest challenges in public health worldwide. UNAIDS estimates that in 1997 5.8 million people became infected with HIV, of whom more than 90% were living in developing countries (1). Over the last three years spectacular progress has been made in the treatment of HIV infection, which is at least in part responsible for the decrease in AIDS incidence and mortality in industrialised countries since 1995-1996. Unfortunately, due to the high cost of the drugs and other operational constraints, in the foreseeable future treatment for HIV infection will remain unavailable for the vast majority of infected persons in developing countries. Also the prospects of having a vaccine ready soon, are rather slim. For many years to come prevention of the spread of HIV to as yet uninfected persons will remain the main strategy to combat the immense human suffering associated with the morbidity and mortality due to HIV infection.

The majority of the world's HIV infections are acquired through sexual intercourse, making HIV infection the most serious and deadly STD (sexually transmitted disease). The other STD's¹ include diseases caused by a range of micro-organisms including viruses, bacteria and protozoa. The latter are the most widespread STD's and include gonorrhoea, chlamydial infection, syphilis and trichomoniasis. They are relatively easy to treat and are curable. An estimated 333 million of these curable STD's have occurred worldwide in 1995 (2). The highest incidence rates have been estimated for sub-Saharan Africa, Latin America and the Caribbean, and South and South East Asia.

Although most of the "other" STD's and their complications have been known for many years, their public health importance is only fully acknowledged since the advent of the HIV/AIDS pandemic and since it became clear that there is interaction between other STD's and HIV infection. It is now widely accepted that control of other STD's ought to be an essential component of any programme aiming at reducing the spread of HIV.

In this paper we will first examine the rationale for STD control as part of HIV control programmes. Then we will go on to discuss the main strategies for the control of other STD's, with an emphasis on the control of curable STD's.

Factors determining the spread of HIV

Whether an uninfected person will acquire HIV through sexual intercourse will depend on the probability that he/she has intercourse with an infected partner; and secondly on the probability that the virus is transmitted through sexual intercourse (see **Figure 1**).

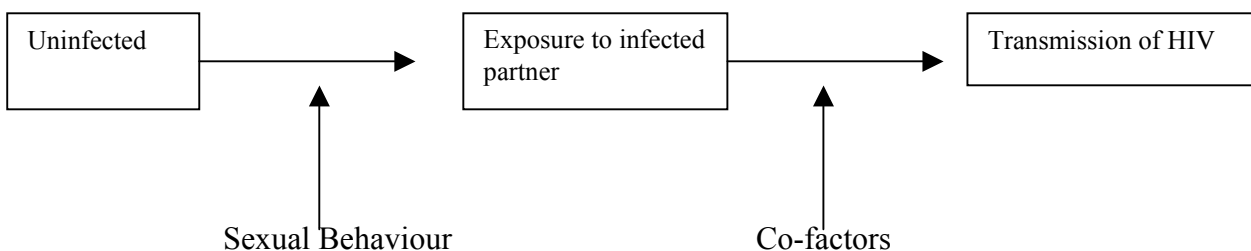


Figure 1

The probability of exposure to an infected partner is determined by sexual behaviour. Since the start of the HIV epidemic many studies have documented the overlapping risk factors for HIV infection and other STD's in terms of sexual behaviour. Frequent partner change and sexual contact with commercial sex workers have been identified as important risk factors for both HIV infection and diseases such as syphilis, gonorrhoea, chancroid, chlamydial infection etc. On the other hand condoms have been shown to be an effective barrier against the transmission of HIV, as well as other STD's.

The transmission probability of HIV during sexual intercourse between men and women has been estimated at around 0.001 to 0.005 per sex act. This is much less than for instance the transmission probability of gonorrhoea and of hepatitis B. Several behavioural and biological factors have been identified which decrease the transmission of HIV (e.g. condom use) or enhance the probability that the virus is passed on to the uninfected partner. Among the factors that enhance the transmission of HIV, the presence of another STD in one of the two partners or in both takes a prominent place. From a public health point of view other STD's are among the most important co-factors in the transmission of HIV because of their high incidence and prevalence in many populations and because of their vulnerability to intervention.

"Other" STD's as co-factors for HIV transmission

The question whether other STD's enhance the transmission of HIV during sexual intercourse has been debated and researched for many years. First, cross-sectional studies found that men and women who had a history of STD were more likely to be HIV infected than men and women with a similar sexual behaviour pattern but no history of STD. Longitudinal studies among clients of sex workers in Nairobi and among sex workers in Kinshasa and Nairobi, established the causal link between presence of another STD and the acquisition of HIV infection (3,4,5). For instance Laga et al. found that HIV negative sex workers in Kinshasa had a higher risk of acquiring HIV infection in a certain time period, if during that time period they had suffered from gonorrhoea or chlamydial infection (4). This suggests enhanced susceptibility of HIV uninfected people if they are suffering from another STD.

The strongest epidemiological evidence so far for an enhancing role of other STD's in HIV spread has been provided by a community intervention trial in Mwanza, Tanzania. Twelve communities were selected within the catchment area of health centres and dispensaries. A programme was set up of improving STD case detection and management at primary health care level. This programme, the so-called intervention, consisted of a refresher course for health care workers; supply of appropriate antibiotics for the treatment of STD's; and regular supervision. The intervention was first introduced in 6 communities. Over two years the incidence of HIV infection was found to be 42% lower in the intervention communities than in the control communities, which received the intervention at a later date (6).

The last piece of the puzzle of the interaction between HIV infection and other STD's has recently been provided by studies on shedding of HIV in genital secretions. Female sex workers in Abidjan were found to be shedding more HIV in their genital secretions when they had another STD and this increased shedding was reversed by treatment of the STD (7). Likewise, a study in Malawi found that men with urethritis shed more HIV in their semen than men without urethritis and men who were treated for their urethritis (8).

These latter studies point to an increased infectiousness of HIV infected persons when they are suffering from another STD, be it a non-ulcerative STD or a genital ulceration. As mentioned

before the study among sex workers in Kinshasa pointed to an increased susceptibility for HIV infection in the presence of another STD. Indeed, the presence of another STD in an HIV infected person increases his/her infectiousness, while an HIV uninfected person is more susceptible to HIV infection if he/she is suffering from another STD. As such it has been hypothesized that one of the explanations for the much more rapid spread of HIV infection in some populations in developing countries compared to industrialised countries, is the higher prevalence and incidence of other STD's in the former populations. In Thailand for instance it has been estimated that the probability of transmission of HIV infection from sex workers to army recruits is 0.031 per sex act which is substantially higher than the probability of female-to-male transmission of 0.001 which has been estimated in studies of discordant couples in industrialised countries (9).

Strategies for the control of "other" STD's

Broadly speaking there are two strategies for the control of "other" STD's. The first aims at reducing the probability that an uninfected person is exposed to a person with a sexually transmitted infection. This is achieved by changing sexual behaviour towards safer sex, e.g. by avoiding sex with high risk partners, such as commercial sex workers, and by using condoms. The second strategy aims at reducing the pool of infected persons in the community, i.e. reducing the prevalence and incidence of STD's. This can be achieved by changing sexual behaviour but also by "removing" infected subjects from the population through treatment.

Both these strategies intervene on factors that also determine the rate of spread of HIV infection. Safer sex leads to less exposure to persons infected with a sexually transmitted infection, including HIV infection. A reduction in the prevalence and incidence of other STD's will reduce the prevalence of an important co-factor in the transmission of HIV infection and will thus decrease the overall transmission probability of HIV during sexual intercourse. We will now discuss these two strategies.

Changing sexual behaviour

Controlling the spread of STD's through changing sexual behaviour has for many years been neglected because the most widespread STD's were curable and because sexual behaviour change was not considered feasible nor cost-effective. Under the threat of the HIV/AIDS epidemic attitudes towards this strategy have changed. It became clear that our knowledge about sexual behaviour was rather patchy and blurred by prejudices and taboos. Since the early 1980's however a lot of research has been done on sexual behaviour and its determinants. And innovative approaches have been tried out to address and change high risk sexual behaviour. Interventions to change behaviour towards safer sex range from population based interventions, such as mass media campaigns and social marketing of condoms, to individual counselling by peer educators or professional staff at counselling centres and STD care services.

Any behaviour change is a slow process but some remarkable successes have been booked in the area of sexual behaviour. The Thai government for instance launched a large scale campaign for condom use in brothels, soon after the start of the HIV epidemic in Thailand in the mid 1980's. The proportion of commercial sex acts where a condom was used increased from 25% in 1989 to 94% in 1993; in the same time period the number of men presenting with gonorrhoea at government services decreased from 84.675 to 14.750 (10). Also in several other countries social marketing programmes for condoms have led to substantial increases in condom sales.

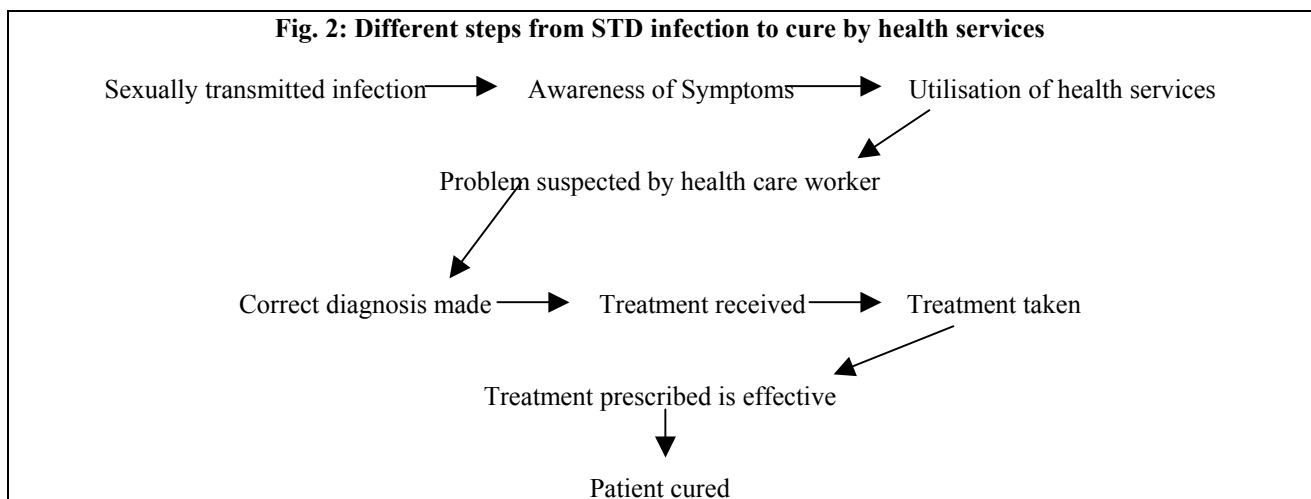
It is now generally accepted that advising patients on safe sex ought to be part and parcel of STD care. A clinic visit for an STD offers a unique opportunity for providing sexual health education to

individual patients. Patients seeking care for an STD are more receptive to information and advice in order to avoid suffering from the same disease in the future, especially if advice is given in the context of good clinical care. This was for instance demonstrated in a group of sex workers in Kinshasa, Congo (formerly Zaire), who attended a specialised clinic. The women were more receptive to prevention advice and started using condoms more frequently once they realised they were receiving good quality care at the clinic (11). Sexual health education in the context of STD care should include information on the nature of the disease and treatment, advice on risk reduction, including condom use, and partner notification.

Reducing the pool of infected persons in the population: detection and treatment of STD cases.

Some of the most widespread STD's, such as gonorrhoea, chlamydial infection, syphilis and trichomoniasis, are caused by bacteria and protozoa and can be cured by relatively simple and cheap means. Prompt cure by treatment constitutes an additional strategy for the control of these STD's by reducing the time during which STD patients are infectious and would transmit the infection to their sex partners. In order for case detection and management of STD's to contribute to the control of STD's in the population the coverage of STD patients by effective curative services needs to be maximal. Keeping this in mind what are the issues in STD case detection and management as control strategy of STD's?

The lack of cheap, simple and reliable diagnostic tools for the detection of STD's is generally perceived as an important obstacle in the efficient management of these infections. Also the increasing resistance of *N. gonorrhoea* and, to a lesser degree, *H. ducreyi* against commonly used and relatively cheap antibiotics is raising a lot of concern. These however are only a few of the factors that determine how many cases of STD that occur in the community will ultimately be cured by the health services. **Figure 2** depicts the steps a person with an STD takes before he/she can be considered cured by the health services.



Ideally all individuals with a sexually transmitted infection are symptomatic and immediately aware that they have a health problem. They promptly seek care from health services that are competent to provide cure. The health worker immediately suspects the patient of suffering from an STD and makes an accurate diagnosis. The patient receives a prescription for efficacious medication, collects the drugs and takes them. He/she complies with safe sex advice and informs his/her partners. In reality however at each of these steps something goes wrong leading to a sub-optimal cure rate. The cure rate achieved by health services depends on the proportions of patients that go from one step to the next.

A first obstacle to the effectiveness of case detection and management of STD's are the many infections that remain asymptomatic and thus go undetected by patients and health workers. Population based studies, as well as studies among women attending antenatal clinic or family planning clinic and studies among partners of STD patients, revealed high proportions of asymptomatic infections among persons infected with *N. gonorrhoea* or with *C. trachomatis*. It is as yet unclear which role these asymptomatic infections play in the epidemiology of STD's, in particular whether they are as infectious as symptomatic infections and whether they are as important in enhancing the transmission of HIV infection. At the same time however they constitute an important pool of infections in the population.

Utilisation of health services by patients with an STD depends on the accessibility, in geographical and economic terms, and the acceptability of these services. Clinical services for STD's pose special problems due to the stigma that is attached to STD's in most cultures. Privacy and confidentiality are major concerns of potential users of STD clinical services, even if they are known to provide efficacious treatment. Studies conducted in Tanzania, Malawi and Swaziland found the proportion of STD patients who would attend public health services to seek care for their STD, to be at most 50%. There was a strong preference for private practitioners and traditional healers who were perceived as more understanding than the health workers in the public services. On the other hand there is evidence that improving services for STD patients also improves care seeking behaviour in the sense that more STD patients will come forward for treatment. This has been shown for instance in Mwanza Region, Tanzania, where improving the quality of care of STD patients raised the proportion of STD patients in the community who attended the public services (H Grosskurth, personal communication).

Confirmation of the sexually transmitted infection depends on the level of suspicion of the health care worker and on the diagnostic techniques used. In low resource settings laboratory diagnosis is usually not feasible because it is too costly or too complicated. Health workers have to rely on clinical algorithms. The performance of these algorithms varies but in general their sensitivity is quite acceptable in symptomatic patients, while the specificity is often too low, especially in women, which leads to over treatment of patients.

Whether or not a patient is prescribed the correct treatment and receives the medication depends on several factors. Resistance against commonly used antibiotics is an increasing problem for gonorrhoea and to a lesser degree chancroid. Regular testing for the emergence of resistance and adaptation of the treatment guidelines is essential to prevent this problem from becoming uncontrollable. Other factors relate to the functioning of health services. Health care workers need to be aware of treatment guidelines and need to be compliant with them. Also availability of even basic drugs can not be taken for granted in most health services in developing countries.

The list of potential obstacles to effective case detection and management of STD's is long. On the other hand many problems, such as the provision of efficacious drugs and the supervision of health care workers in STD services, are related to the functioning of health services and are in principle vulnerable to interventions. The one exception remains the asymptomatic infections. Which alternatives are available to address this problem? Regular screening of certain population groups is a theoretical option. Screening for chlamydial infection in young women has for instance been done in Sweden for a number of years, with good result. Such strategies however are too costly and not feasible in many industrialised country settings, let alone in low resource settings. As long as there is no cheap, simple and non-invasive test for the detection of gonorrhoea and chlamydial infection, screening for asymptomatic STD's remains an illusion. These problems as well as the operational problems of passive case detection and management of STD's in low resource settings has led to the suggestion that mass treatment of STD's should at least be considered an option. In the past attempts have been made to control STD's with mass treatment. The effect was found to be transitory.

Moreover the logistic difficulties of reaching high numbers of people within a short time span make such strategy rather problematic, as well as costly. On the other hand contact tracing, which is a well established strategy for the detection of asymptomatic STD's in many industrialised countries, has for long been considered too labour intensive and not cost-effective to be seriously taken into consideration in low resource settings. Recent experiences from a variety of developing countries however have shown that contact tracing for STD's can be feasible at low cost. An intervention study in Zambia for instance showed that individual counselling of male STD patients led to an increase in the number of sex partners that came forward for treatment after being notified by the index patient himself (12).

In addition to good quality STD services for patients in the general population, special STD services may need to be considered for marginalized groups such as commercial sex workers and even adolescents, who would not attend regular health services for a variety of reasons. A number of small scale intervention projects in a research context have demonstrated the feasibility of setting up specialised services for sex workers that achieve reductions in incidence of STD's and HIV infection in this high risk population. Such interventions can be highly cost-effective because they reduce the pool of infections in a so-called "core group", i.e. a group of individuals who are highly sexually active and who maintain STD's in the population at endemic levels.

Concluding remarks

The interrelationship between HIV infection and other STD's offers a unique opportunity for prevention of the spread of HIV, i.e. controlling one infectious disease that is more easily controllable to control another, more difficult to manage disease. That it is possible to reduce the incidence of HIV infection by improving case detection and management of other STD's has convincingly been shown by the community intervention trial in Mwanza, Tanzania. It ought to be pointed out that this intervention was not a "high tech" intervention but actually consisted of activities that are normally part and parcel of every well functioning health system. For instance, it was estimated that before the intervention drugs prescribed for gonorrhoea would cure at most 25% of cases presenting to the public health services. Following a survey of the sensitivity of N. gonorrhoea treatment guidelines were changed and health centres were provided with cotrimoxazole for the treatment of gonorrhoea instead of tetracycline and penicillin. The former antibiotic has an estimated efficacy in Mwanza Region of over 90%.

One last word of caution however is still needed. In Mwanza, improving STD case management led to a 42% percent reduction in incidence of HIV infection. Such large impact is unlikely to be generalised to other situations. The impact of STD case management on HIV incidence will depend on the incidence and prevalence of STD's and the prevalence of other factors that determine the rate of spread of HIV in the population. Control of "other" STD's is an essential component of every HIV control programme where the predominant route of transmission is sexual intercourse. It can however not be considered a "magic bullet" and should be part of a comprehensive package of interventions which also includes interventions to reduce risky sexual behaviour, prevention of percutaneous infection and of mother-to-child transmission.

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