Review

Impact of interventions promoting condom use among HIV-infected individuals

Mariângela F Silveira[a] and Iná dos Santos[b]

[a]Departamento Materno-Infantil. Faculdade de Medicina. Universidade Federal de Pelotas (UFPel). Pelotas, RS, Brasil. [b]Programa de Pós-Graduação em Epidemiologia. Faculdade de Medicina. UFPel. Pelotas, RS, Brasil

Abstract
In order to identify educational interventions promoting male condom use during intercourse among HIV+ persons, we conducted a systematic review of publications. Lilacs/Bireme, Medline and Popline data sets and CDC and UNAIDS sites were searched without time limit. Uniterms used were: women; men; interventions; HIV; Aids; HIV positive; risk behaviors; sexual risk behaviors; and intervention studies. Fourteen interventions were included, eight of which reported a positive result. Most frequent methodological weaknesses observed were lack of randomization, no control for confounding, high rates of losses to follow-up, small sample sizes, and outcome of condom use stated by patient self-report. Publication bias favoring studies showing a beneficial effect has to be considered. Effective interventions aiming to promote condom use among HIV positive persons are currently an important tool in the prevention of HIV dissemination.

INTRODUCTION

The acquired immunodeficiency syndrome (AIDS) is a challenge in terms of control and treatment. In December 2001, an estimated 40 million people carried the Human Immunodeficiency virus worldwide, of which 18.5 million were women. With the increase in the number of cases classified as of heterosexual transmission, the contamination of women is on the rise. Almost one-half of the four million persons infected in 2001 were women. A large share of these women are contaminated between ages 15 and 24 years, at the height of their reproductive lives, thus leading to an increase the number of cases among children due to mother-to-child transmission. In Latin-America, there are about 1.5 million HIV+ persons, and 28% of HIV+ adults are women.[24] According to the Brazilian Ministry of Health, it is estimated that the number of HIV+ persons in Brazil is in excess of 500 thousand. Between 1980 and December 2002, more than 250 thousand cases were registered in the country, of which 28% were women. In 2001, the male-to-female ratio among AIDS cases was 1.7.[3]

With the advent of antiretroviral therapy, there has been an improvement in the quality of life of HIV+ persons. In Brazil, antiretroviral therapy is offered free of charge by the Ministry of Health, which has led to an increase in patient survival. Prevention measures are thus becoming increasingly important among identified HIV+ persons. Moreover, acquiring other STDs (Sexually Transmissible Diseases) makes reductions in immunity more likely among HIV+ patients, and failure to use condoms with seropositive partners prevents an adequate control of viral load and increases risk of contamination by antiretroviral-resistant strains.[25]

Condoms are among the most important weapons in the battle against AIDS. Laboratory and epidemiological studies have proved the effectiveness of condoms against a wide range of STDs, including gonorrhea, nongonococcal urethritis, trichomoniasis, and genital herpes, as well as against HIV contamination.[23] On the other hand, data from the literature also show that awareness of being HIV+ does not necessarily imply using condoms in all sexual relations, even with uninfected

Correspondence to:
Mariângela Freitas da Silveira
Avenida Duque de Caxias, 250
96001-970 Pelotas, RS, Brasil
E-mail: maris.sul@terra.com.br

partners with partners whose serological status is not known. However, a bibliographic review conducted in 1993 concluded that the existing evidence strongly support the efficacy of educational measures promoting condom use in the reduction of the transmission of HIV and other infections.[13]

The present article is a review of publications that describe educational interventions directed towards HIV+ persons, whose measured outcome was the use of male condoms.

METHODOLOGICAL PROCEDURES

The Lilacs, Medline, and Popline databases and the Center for Disease Control and Prevention and UNAIDS websites were searched, without time limit. The following Uniterm combinations were used: (women/men and interventions), (women/men and HIV and interventions), (women/men and AIDS and intervention studies), (women/men and HIV positive and intervention studies), (women/men and HIV positive and intervention studies and risk behaviors), (women/men and HIV positive and intervention studies and sexual risk behaviors), (HIV positive and interventions), (women/men and HIV), (women/men and AIDS), (interventions and AIDS), (HIV positive and sexual risk behaviors and intervention studies).

Initially, the studies returned were manually inspected, removing interventions aimed at non-HIV+ persons, clinical and perinatal interventions among HIV+ persons, educational interventions not related to sexual behavior, and descriptive studies. After the initial inspection, all articles identified were read in full and those pertinent to the subject were selected. We identified and obtained 10 articles from the Medline database, of four were pertinent to the review. From the Popline database, we obtained 15 articles, of which two were selected. No articles were identified in the UNAIDS website or in the Lilacs/Bireme database. A single reference was found in the CDC website, but was discarded.

We checked the references of all articles read, including those discarded. We identified 29 references, of which eight were included in the review. In total, 14 articles were included in the review.

We included only studies evaluating interventions aimed at HIV+ persons, whether randomized or not, whose measured outcome was the use of male condoms. No studies were rejected based on methodological limitations. Instead, we describe all limitations in Table. Articles fulfilling all inclusion criteria were evaluated and rated according to the 27 criteria proposed by Downs & Black.[8] Briefly, we evaluated clarity in the description of:

1. study hypotheses, aims, and objectives;
2. main outcomes measured;
3. characteristics of the patients included;
4. interventions of interest;
5. distributions of principal confounders in each group of subjects to be compared;
6. main findings of the study;

Other items evaluated were:

7. whether the study provides estimates of the random variability in the data for the main outcomes;
8. whether adverse effects were reported;
9. whether the characteristics of patients lost to follow-up were described;
10. whether probability values were reported for the main outcomes;
11. whether the sample of subjects invited to participate in the study was representative;
12. whether the sample of subjects included in the study was representative;
13. whether the staff, patients, and facilities where the patients were treated were representative of the treatment the majority of patients receive;
14. whether an attempt was made to blind patients to the type of intervention;
15. whether an attempt was made to blind patients to the outcomes;
16. if any of the results were not based on *a priori* hypotheses whether this was made clear;
17. whether, in trials or cohort studies, the analysis adjusts for different lengths of follow-up of patients, or, in case-control studies, the time period between intervention and outcome is the same for cases and controls;
18. whether the statistical tests made to asses the main outcomes were appropriate;
19. whether compliance with the intervention was adequate;
20. whether the main outcome measures used were accurate;
21. whether the patients in different intervention groups were recruited from the same population;
22. whether the patients in different intervention groups were recruited over the same period of time;
23. whether randomization took place;
24. whether randomization occurred until recruitment was complete;
25. whether the analysis included adequate control for major confounders;
26. whether losses of patients to follow-up were taken into account;
27. whether the study had sufficient power to detect an important effect with a 5% significance level.

Item eight, concerned with the measurement of potential side effects, was removed, since it is unlikely that educational interventions have harmful effects. Evaluation of the studies.

STUDIES EVALUATION

The methodological aspects and the results of the 14 studies that evaluated interventions aimed at increasing condom use among HIV+ persons are described in the Table.

Mean methodological score was 14.6 points (SD: 4.8), with five studies scoring less than 14 points and seven studies scoring above the mean. The highest-scoring study[22] was that of Kalichman et al.[14]

The first intervention took place in Zaire. Kamenga et al[15] applied an educational intervention, without a control group, to 168 discordant couples. Couples were identified through systematic HIV testing of the employees of a factory and a bank. Both individual participants and couples received counseling on STDs, HIV, and condom use. During monthly visits, the researchers provided the couple with condoms and with a sexual activity calendar, to be filled separately by each of the members of the couple. Participants were also asked to keep condom packages, which were checked at each visit. The increase in consistent condom use (use in 100% of sexual relations) after 18 months was greater than 70 percentage points. Condom use did not vary with socioeconomic status or place of employment, and was greater among couples in which the man was seronegative. The incidence of seroconversion was low, as was that of STDs, and there was a good correlation between sexual history and the number of packages presented.

A study carried out in Ruanda[1] in 1992 randomly selected women aged 20-40 years form an antenatal and pediatric outpatient facility. Women were tested for HIV and two groups were formed: HIV+ (460) and HIV- (998). Both groups participated in a group discussion with 10-15 members, including a video presentation, and were provided with condoms and spermicide. Follow-up consisted in semestral visits to the service, when gynecological exams, treatment of gonococcus culture-positive women, and condom and spermicide distribution were carried out. After a one-year follow-up period – in comparison with a control group comprising 208 women selected for a cross-sectional study – there was a 31.5% difference in self-reported consistent condom use in favor or the intervention group. Prevalence of condom use was 3.5%, among controls and 35% among HIV+ intervention subjects (p<0,05). The rate of condom

use was higher among discordant couples. Predictors of condom use among HIV+ women included non-monogamous relationships, believing in the inexistence of adverse effects, and partner engaging in intercourse with sex workers.

Allen et al[2] applied an intervention to 153 discordant couples. The control group consisted of 838 women with partners of unknown serological status. The intervention consisted of an educational video, group discussions, and distribution of condoms and spermicide. Intervention and control-group subjects returned to the clinic every three months and underwent annual medical examination. There was a 53% increase (p<0.001) in consistent condom use in the intervention group after a one-year follow-up period. The rate of seroconversion was low. The conversion rate among intervention-group women was below half the rate estimated for the women with partners of unknown serological status. Among men who seroconverted, condom use was significantly lower and alcohol use was reported more frequently. The illiteracy rate was higher among women who seroconverted. Condom use was more frequent when the man was HIV-.

Another study carried out in the United States[5] provided counseling during medical appointments in reference services for 61 HIV+ patients of both sexes. Most patients belonged to ethnic minorities and mean age was 35 years. No difference was observed in condom use with regular partners. The study lacked a control group and behavioral data were collected after the test. The study report was very brief and the authors did not describe the definition of 'condom use' (consistent, in last intercourse, and others) used as an outcome.

In a 'before-after' study among HIV+ men diagnosed with depression,[16] patients were divided into three groups: the first group, with 39 subjects, was offered eight cognitive-behavioral group sessions; the second group, with 38 subjects, eight social support group sessions; and the control group, with 38 patients, received only individual therapy sessions during crises. After three months, the authors evaluated the frequency of unprotected insertive and receptive anal intercourse. Significant changes were observed in the control group, with a reduction in unprotected insertive anal intercourse (p<0.05). In the second intervention group, the effect in terms of unprotected receptive anal relations obtained borderline significance (p<0.06). Intra-group differences were significant among the second intervention group and among controls for insertive anal intercourse (p<0.001); and among the second intervention group only for receptive anal relations (p=0.008).

Table - Characteristics of the intervention studies among HIV+ persons included in the review.

Autor/year/ country	Initial and final N	Sample	Intervention/ control	Outcome	Results	Score	Observations
Kamenga et al,[15] 1991, Zaire	I: 168; 149	Discordant couples	Individual and couple counseling; handing out of condoms and medication	Condom use in all intercourse after 18 months	Initial: <5% 18 m: 77.4% Dif: 72.4 percentage points	10/26	Analyzed only those evaluated for 6 months or longer; transportation subsidies given; visits to absentees.
Allen et al,[1] 1992, Ruanda	I:460; 445 C: 208	HIV+ women, 20-40 years, Random sample of outpatients	Video presentation group and discussion; handing out of condoms; voluntary participation of partners	Reported condom use after 1 year	I: 35.0%: C: 3.5% Dif: 31.5 p.p. p<0.05	15/26	No confounder control: not randomized: not blinded; controls recruited after the end of the study.
Allen et al,[2] 1992, Ruanda	I: 53: 44 C: 838; 608	Discordant couples. Controls: women with partners of unknown serology	Educational video presentation and group discussion; handing out of condoms	Condom use for one year	I: 57%: C: 4% Dif: 53 p.p. p<0.001	18/26	Household visits to absentees Free medical care.
CDC,[5] 1993, EUA	I: 61; ?	HIV+ persons attending reference services	One-session counseling	Mean follow-up of 6 months	No dif. with regular partners	05/26	Short publication (bulletin); no control group; small sample with limited power; no control for the degree of the disease; data collection after post-test.
Kelly et al,[16] 1993, EUA	I1: 39; 27 I2: 38: 14 C: 38: 27	HIV+ men diagnosed with depression	I1: 8-session cognitive-behavioral group I2: 8-session support group C: free individual therapy during crises	N unprotected Insertive Anal Intercourse Initial(A); After 3 months(D) N unprotected Receptive Anal Intercourse Initial(A); After 3 months(D)	I 1 A: 1.6(4.2) D: 2.9(10.2) I 2 A: 0.6(0.4) D: 0.0(0.0) C A: 0.3(0.7) D: 0.1*(0.4) I 1 A: 0.9(2.4)D: 0.4(0.7) I 2 A:0.5(1.1) D: 0.1(0.3) C A:0.8(1.4)D: 0.5(1.1)	14/26	Before-after design: 41% losses. Most losses among severe patients.
Padian et al,[18] 1993, EUA	I: 144; 62	HIV+ persons and heterosexual partners	Individual and couple counseling sessions	Consistent condom use after 1 year	Initial: 49% 1 year 90% Dif: 41 p.p. p<0.001	11/26	No control group: small sample with limited power; substantial losses; self-reported measurements; more stable couples.
Cleary et al,[6] 1995, EUA	I: 135; 91 C: 136; 106	271 HIV + blood donors.	I: support group C: available medical and psychological services	% unsafe sex in last week, after 1 year	Beginning: I: 57%: C: 71.7% Dif: 14.7 p.p. p: 0.03 Follow-up: I: 30.9%: C: 37.7% Dif: 6.8 p.p. p=0.3	21/26	Randomized; effectiveness study; described losses and potential confounders.
Greenberg et al,[11] 1996, EUA	I: 116; 100	HIV+ drug users, entering a community support group	I: weekly group session lasing 1.5-2 hours with 25-30 members and e 2 facilitators	Consistent condom use after 6 months	Beginning: 60% Follow-up: 79% Dif: 19 p.p. p<0.001	11/26	No control group: self-reported measurements.

Table - Continuation.

Autor/year/country	Initial and final N	Sample	Intervention/control	Outcome	Results	Score	Observations
Parsons et al[19] 2000, EUA	M: 255; 154 W:158; 87	HIV+ hemophiliac men aged 18+ years and their sexual partners	I: Based on the transtheoretical model C: partial or no intervention	Consistent condom use after 3 months	Men with partners: 68% Men without partners: 22% Partners: 69% Non-significant major effect	14/26	Quasi experimental: self-administered questionnaire; no differentiation between controls and intervention group.
Fogarty et al[9] 2001, EUA	I: 164; 117 C: 158; 125	HIV+ women aged 18-44 years	I: individual and group care C: routine and emergency appointments	Progress in condom use with main partner (general effect) after 18 months	Progress in relation to controls: OR: 2.3 p=0.02	17/26	Randomized: losses between 21 and 42%; sample similar to HIV clinical scenario; paid US$20.00/interview; 'intent to treat' analysis.
Gielen et al[10] 2001, EUA	I: 40; ? C: 30; ?	Sub-sample with main sexual partner at baseline and follow-up		Progress in condom use with main partner after 6 months	Progress in relation to controls: OR: 2.67 p=0.04	20/26	
Grinstead et al[12] 2001, EUA	I: 94; 61 C: 29; 20	HIV+ prison inmates to be released in 6 months	I: series of 8 sessions in two consecutive weeks	Condom use in fist intercourse after release	I: 81%; C: 68% Dif: 0.30(Cohen h)	11/26	Low statistical power.
Kalichman et al[14] 2001, EUA	I: 185; 141 C: 143; 110	HIV+ men and women recruited from AIDS and infectious disease services	I: 5-session groups based on the Social Cognitive Theory C: 5-session support group	% condom use in vaginal and anal sex with all partners after 6 months	Beginning: I: 75.5%; C: 57.1% 6 months: I: 71.7%; C: 54.6% Dif: 17.1 p.p.	22/26	Randomized.
Rotheram-Borus et al[16] 2001, EUA	I: 208; 124 C: 102; 30	HIV+ youths aged 13-24 years seen at 9 clinics	23 group sessions divided into 2 modules (6 months), based on the 'Social Action' model C: regular care	% unprotected intercourse (after module II)	I: 2.8%; C: 15.5% Dif: 1.7 p.p. p< 0.01	15/26	Grups designed in sequence: charged for sessions; 15-month followp-up.

I: intervention; C: control; W: women; M: men; Dif: difference
*p=0.05

Padian et al[18] carried out a study in the US with 144 HIV+ subjects (78% men, mostly bisexual) and their heterosexual partners, recruited from counseling and testing services. Visits and testing were biannual in average and usually took place at the participant's home. At each visit, each member of the couple was interviewed, in separate, and received counseling regarding safe sex practices. This was followed by a joint counseling session for the couple. Consistent condom use after one year follow-up was 90%, a 41% increase (p<0.001) in relation to the beginning of the study. Most behavioral changes took place between the beginning of the study and the first follow-up visit, and there were no cases of seroconversion. Sexually abstinent couples were excluded from the analysis of condom use. The study lacked a control group and had substantial losses (41% in the first year).

Cleary et al[6] worked with blood donors identified as HIV+ by the New York Blood Center and who accepted to participate in the study. The study was randomized, including 135 subjects in the intervention group and 136 in the control group. After notification and counseling, controls were oriented to seek medical and psychological services available in the community. Subjects in the intervention group participated in a support group including a social assistant and a psychiatric nurse, based on a cognitive-behavioral approach and on skill training. Groups with seven to nine members met for 90 minute-sessions, on a weekly basis, for six weeks. Follow-up was biannual. At the one-year follow-up, a marked reduction in reported unsafe sex in last week was seen in both groups (p<0.001), but there was no significant difference between groups. The greatest predictor for unsafe sex during follow-up was reported unsafe sex immediately prior to notification, and the greatest predictor for its absence was older age of the infected person. The authors

suggest that one of the reasons behind the ineffectiveness of the intervention may be the high availability of alternative medical services in the area where study was conducted.

In the study by Greenberg et al[11] (USA), the intervention was administered to 116 HIV+ drug users upon entry to a community support group. There was no control group. Seventy-seven percent of participants were men and 93% were African-Americans. Age ranged between 25 and 31 years. Groups met weekly, sessions lasting for one-and-a-half to two hours. The groups were composed of 25-30 members and two facilitators. The aim was to strengthen participants so that they become self-sufficient, adopt healthy lifestyles, and develop interpersonal relationships that eliminate the need for risk behaviors. The greatest focus was placed upon drug addiction and safety in drug use. Patients received transportation and food subsidies and were paid to give interviews. There was a 19% increase in consistent condom use (p=0.001). An increase was also seen in the use of condoms with fixed and casual partners. There was no significant association between the number of sessions attended or treatment for drug addiction and increased condom use. The authors suggest that groups of this sort should place greater emphasis on safe sex practices and on HIV prevention, and emphasize the low cost of this type of intervention.

An intervention based on the transtheoretical model was used by Parsons et al[19] (USA), in 255 HIV+ hemophiliac men and their sexual partners (158). The study was conducted in 15 American states, and included multiple hemophiliac treatment facilities and organizations. The approach offered to the intervention group was divided into two components: communication skills (three modules, totaling three to four hours in average); and observation of the subject's stage of change, with the administration of activities based on this stage (one hour each). The intervention lasted one year, was usually in group but individual at times, and follow-up was carried out three months after the end of the intervention. Controls received either a partial or no intervention. Score results were measured by interaction. The effect of the intervention on consistent condom use was not significant. Among men, there was a significant increase in safe sexual behaviors. Women in the intervention group reported greater condom use by their male partners during last vaginal intercourse (OR=6.92; p=0.01).

Fogarty et al[9] (USA) conducted a randomized study among HIV+ women aged 18-44 years. Participants were recruited from clinics and outpatient treatment facilities for HIV+ persons, pediatric hospitals for HIV+ mothers, and through reference of participants and healthcare agents. Women in the intervention group (164), in addition to the regular care provided to controls (158), were provided with theoretically-based care by trained HIV+ individuals. Care was provided individually and in groups, and focused on the following behaviors: use of condoms with main partner, use of condoms with other partners, and use of contraceptives. Interviews were paid (US$20 each) and evaluated demographic, risk-related, and behavioral (stage of change, self-efficacy, and advantages and disadvantages of condom use) data. Patients were followed for 18 months after the intervention. A progress in use of condoms with main partner was seen in the patients of the intervention group (OR=2.3; p=0.02). The study by Gielen[10] was a subanalysis of this same study, and included only women with a fixed partner at the beginning of the study and six months after the intervention. This study included 40 women from the intervention group and 30 from the control group. Progress in condom use with main partner among women in the intervention group showed an odds ratio of 2.67 (p=0.04).

Also in the United states, Grinstead et al[12] conducted an intervention aimed at HIV+ prison inmates scheduled to be released in six months. A total 94 men received the intervention and were compared to 29 controls – also prison inmates – that refused to participate in the intervention sessions. Each participant attended eight sessions lasting between two and two-and-a-half hours in two consecutive weeks. These sessions included information on HIV, treatment, drug use, sexuality, and nutrition, among other subjects. In addition, these subjects were referred to community treatment centers, financial assistance, programs for alcohol and drug addicts, and educational and vocational training. The outcome investigated was use of condoms during first intercourse after release. Indeed, reported condom use in the intervention group was 81%, versus 68% in the control group, but this difference was not statistically significant.

Another randomized study was conducted by Kalichman et al (USA).[14] HIV+ subjects of both sexes were recruited from AIDS and infectious disease facilities. The intervention group (185) participated in a five-session group intervention, based on the Social Cognitive Theory, focusing on strategies for practicing safer sex. The control group was offered a five-session health management support group. Six months after the intervention the percentage of consistent condom use during anal and vaginal intercourse with all partners was greater among the intervention group (p=0.05). The lower rates of anal and vaginal intercourse in the intervention group were also signifi-

cant. However, intervention and control groups were not comparable, condom use being greater in the intervention group already at the baseline.

Finally, a study conducted in the United States by Rotheram-Borus et al[20] evaluated the impact of an intervention among HIV+ youths seen at clinics of four American cities. The intervention group, comprising 208 subjects, underwent 23 small-group sessions divided into two modules: 'Stay Healthy' and 'Act Safe.' The intervention was based on the 'Social Action' model, and each module lasted for three months. The control group (102 subjects) received the regular care provided by the services. After Module I, more positive lifestyle changes were seen among the women in the intervention group. After Module II, the youths in the intervention group reported 82% fewer unprotected sexual acts; 45% fewer sexual partners; 50% fewer HIV- sexual partners; and 31% less substance use. There was no difference with respect to the disclosure of HIV status to sexual partner. The total cost of the intervention itself was US$980.00 per subject.

In summary, only three of the studies were randomized.[6,9,14] Five studies lacked comparison with a control group.[5,11,15,18,19] Follow-up time showed great variability between studies, ranging from three months to over three years.[18] The type of intervention was also widely variable, some interventions being much longer and more elaborate than others.

Most common limitations were absence of randomization, lack of confounder control, substantial losses, lack of 'intent to treat' analysis, and insufficient statistical power. In addition, most studies based their evaluations of the outcome on the reports of the HIV+ subjects on their sexual practices. Concerning the results, of the 14 studies reviewed, eight showed at least some positive effect of the intervention. Results suggest a greater effect in shorter follow-up periods, of up to one year.

COMMENTS

The present review showed that, in general, the studies conducted report positive effects of educational interventions on the frequency of condom use among HIV+ persons. The results obtained by more elaborate and costly interventions were not much superior to those obtained by interventions of shorter duration and simpler execution. Comparisons between the results of the different investigations is hampered by the great variability in quality, methodology used, and outcomes measured. Study heterogeneity with respect to type of intervention, study population, and methodology prevented us from obtaining an aggregate

measure through metanalysis. A potential publication bias must be considered, since, in general, intervention studies that show beneficial effects are more likely to be published than those with null effects.[21]

Worthy of note is the fact that most studies are based on self-reports of HIV+ persons concerning sexual behavior. The reliability of self-reported sexual behavior among adolescents was investigated by Brener et al,[4] who conducted a test/retest study in which self-administered questionnaires were answered by 1,679 students from grades 7 to 12 with a 14-day interval. These authors reported kappa statistics of 0.71 for onset of sexual activity before age 13; 0.81 for four or more sexual partners in life; and 0.48 for four or more sexual partners in the last three months. Another validation study was carried out in order to evaluate the veracity of self-reported condom use among an urban population at high risk for STDs/AIDS. In a prospective cohort study, the authors investigated sexual events, condom use in last 30 days, risk factors, STD history, and presence of infections through laboratory exams for chlamydia, gonorrhea, syphilis, and trichomoniasis. The investigation was repeated after three months. Self-reported condom use was not associated with lower incidence of STDs. The authors concluded that self-reporting, even in research settings, may be subject to substantial information bias.[27] Such findings suggest that, ideally, in this field, biological markers should be used in addition to the subject's report in order to measure the effect of interventions. We speculate that this procedure is not adopted routinely by researchers due to its high cost.

It is important to keep in mind the need for establishing truly effective interventions aimed to increase condom use among HIV+ persons. Improvements in health and reductions in viral load brought about by current antiretroviral therapies may lead to a feeling of lesser need for safe sex practices, even though undetectable amounts of viral RNA do not necessarily mean that the patient is not infective.[25] As indicated previously, [17] investing in prevention among HIV+ persons may be more effective than investing in the general population for three reasons: 1) greater effect on the dissemination of the epidemic (cost-effectiveness); 2) the degree of preventive altruism among HIV+ persons is generally greater than the self-protective efforts of uninfected persons; and 3) there is reason to suppose that such altruism may be reinforced by appropriate interventions.[17] A study conducted in the United States[26] showed that, compared to women at risk, HIV+ women reported lesser sexual activity and substance use; more frequent condom use (63% vs. 28%) during vaginal intercourse; and more frequent consistent condom use during all in-

tercourse. A change in the risk behavior of an HIV+ person will, in average, and in the majority of affected populations, yield a greater effect on the dissemination of the virus than an equivalent change in an uninfected person. The magnitude of this difference depends on the prevalence of the virus in the population: the difference will occur if HIV prevalence is lower than 50% and will be greater the lower this prevalence is. For example, with 20% prevalence, the impact will be four times greater; with 5% prevalence, it will be 19 times greater. Notwithstanding, there are much fewer preventive interventions aimed at HIV+ than at HIV- persons.[17]

Generally speaking, interventions aimed at HIV+ persons involve techniques to improve quality of life (risk behaviors are associated with stress, low self-esteem, marital dissatisfaction, and problems with alcohol and drugs) and to promote reflection upon the person's conduct and its consequences (which has proved effective, at least among discordant couples). Authors agree that impositions and ethical or moral judgment must be avoided, and recommend that, to achieve prevention, it is necessary to promote serological testing; identify and test partners; carry out post-test counseling; improve contact with HIV+ persons, improve the quality of life of these persons; promote educational interventions in case of persistent risk behavior; and carry out cognitive interventions when feasible. In poor countries, an option would be to provide economic subsidy to HIV+ persons engaged in prostitution, so that these persons can afford to abandon this activity (cost-benefit). Simpler, less expensive, and effective alternatives should be preferred.[17]

Even though the efficacy of risk-reduction interventions based on cognitive-behavioral principles is widely documented in the literature, the successful dissemination of HIV prevention models from research to practice will require mechanisms for providing resources and technical assistance, especially to smaller facilities. Researchers can facilitate this process by developing interventions that consume less time and resources than the current models.[7]

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