Effect of HIV Counseling and Testing on Sexually Transmitted Diseases and Condom Use in an Urban Adolescent Population

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Objectives: To determine whether human immunodeficiency virus (HIV) counseling and testing has an effect on reducing subsequent risk behaviors in those tested, to evaluate stability in condom use over time, and to determine whether self-reported frequency of condom use relates to the incidence of sexually transmitted diseases (STDs).

Design: Cohort study with 2-year follow-up.

Setting: An urban adolescent-medicine clinic.

Participants: A random sample of 149 patients (118 female and 31 male adolescents) with a mean (±SD) age of 16.4 ±1.51 years were selected from a cohort of 500 patients at high risk for HIV infection. The patients had received a risk behavior questionnaire during pretest counseling for HIV testing. They were divided into 3 groups, identified by the letter F, S, or R, based on their self-report of frequency of condom use at enrollment: 24% used condoms frequently/always (F); 40%, sometimes (S); and 36%, rarely/never (R). One hundred twenty-six patients (85%) made return visits.

Intervention: HIV counseling and testing.

Main Outcome Measures: Medical record documentation of STDs before and after HIV testing, and self-reported condom use frequency.

Results: Before HIV testing, all 3 condom use groups had a similar frequency of STD visits per month. The number of STD visits per month did not decrease significantly in the posttest period for either the total group or each of the 3 subgroups. Also, most patients (F, 67%; S, 44%; R, 53%) in each of the 3 subgroups had shifted unfavorably to rarely/never (R) condom use within the month before their follow-up visit. Only 24% (8 patients) of those in the initial frequently/always (F) group reported continued frequent condom use.

Conclusions: As has been found in adult studies, single-dose interventions such as HIV counseling and testing did not seem to reduce HIV risk behaviors in our sample of high-risk adolescent patients. None of the 3 groups showed a significant decrease in STDs after HIV testing and counseling. Also, our adolescent patients reported widely varying condom use frequency over time, yet the incidence of STDs did not correlate with self-reported condom use.

SUBJECTS AND METHODS

SUBJECTS

The adolescent medicine clinic at Children's National Medical Center, Washington, DC, serves a predominantly minority, urban population of adolescents from ages 12 to 21 years. Approximately 8000 adolescents visit this clinic annually for ambulatory care. As part of a study on HIV seroprevalence, 500 patients were deemed to be at high risk for HIV, defined as meeting 1 or more of the following criteria: having had multiple STDs, syphilis, or pelvic inflammatory disease; having had male-to-male sexual contact; having used injection drugs; or having exchanged sex for money, goods, or shelter. We compared the sociodemographic information from the enrolled, high-risk patients with that of the general clinic population and found that there were no overall demographic differences between the 2 groups. This study involved serial, confidential HIV testing with pretest and posttest counseling, written informed consent, and full disclosure of results. The study was approved by both the Children's National Medical Center IRB and the IRB of the Centers for Disease Control and Prevention (CDC), Atlanta, Ga.

From this subject group, the participants for this study were selected. Of the 500 subjects enrolled in the CDC study, 301 met the following eligibility criteria for this study: (1) they had to be HIV negative; (2) they must have returned for follow-up visits for any reason to either the adolescent clinic or the emergency department after enrollment (which began in September of 1988) but before September 1, 1992, the date the medical record review began; and (3) their medical records must have contained documentation of all visits to the center as identified by the available registration data. From this group, 149 subjects (50%) were randomly selected for inclusion in this study.

REVIEW PROCEDURE

Medical record review was conducted on 149 randomly selected subjects (49%) of the 301 who met the eligibility criteria. Subjects were assigned to 1 of 3 groups, identified by the letters F, S, or R, based on self-report of condom use at enrollment in the CDC study: frequently/always (F); sometimes (S); rarely/never (R). All subjects in the CDC study were also given an extensive questionnaire regarding their sexual and risk behavior histories, such as age at first intercourse and illicit substance use.

Medical records were reviewed for all clinic and emergency department visits. All data on documented or suspected episodes of STD were abstracted. Sexually transmitted diseases were defined as newly documented infections with one or more of the following: Neisseria gonorrhoeae, Chlamydia trachomatis, Treponema pallidum, herpes simplex virus of the genitalia, human papillomavirus of the genitalia, and Trichomonas vaginalis. Only STDs that were confirmed by laboratory testing were included in the tabulation. Episodes of suspected STDs with negative cultures were not included in the assessment.

METHODS

We sought to determine whether HIV counseling and testing had an effect on the subsequent incidence of STDs in our population of adolescents by comparing the number of STDs acquired by each study subject both before and after HIV counseling and testing. We defined the HIV pretest period as beginning with the first visit to the adolescent clinic or emergency department after the subject had attained the age of 12 years until the date of HIV counseling and testing. The HIV posttest period was from the date of HIV counseling and testing until the date of last contact with the adolescent clinic or emergency department, or until the subject had attained the age of 22 years, whichever came first. We then created a measure of STD visits (visits to the clinic or emergency department where an STD was diagnosed) per month to control for the varying lengths of time that the patients received services at the Children's National Medical Center hospital in the pretest and posttest periods. For each study subject, the number of visits per month for STDs before HIV counseling and testing was compared with the number of visits per month after testing. We then assessed the overall change in STD incidence for each condom use group and for the total group, and went on to explore the intergroup differences in STD incidence.

Beyond determining whether the incidence of STDs changed after HIV counseling and testing, we sought to evaluate the extent of risky sexual behaviors by assessing the variability of condom use over time in our population. HIV result disclosure and posttest counseling was done 2 weeks after testing. Subjects in the study were also seen for a follow-up assessment from 6 months to 1 year after enrollment. During their follow-up visits, subjects were given a questionnaire concerning their sexual behaviors during the intervening months. They were specifically questioned regarding frequency of condom use in the follow-up period. These responses were compared with their initial reports of condom use at enrollment. All questionnaires were administered as a structured interview by 1 of 2 interviewers.

Analyses were conducted using a statistical software package (BMDP Statistical Software, Release 7, SPSS Inc, Chicago, Ill). Analyses included descriptive statistics, $\chi^2$ analysis, Wilcoxon signed rank tests, analysis of variance (ANOVA) F tests, and Kruskal-Wallis tests with a critical value of 0.05.
of sexual partners. However, some of the males and all of the females did nothing to increase their safer sexual practices.

Zenilman et al11 studied the effects of HIV counseling and testing on reducing subsequent high-risk behavior in a public health clinic setting. Patients tested for HIV who returned for result disclosure and posttest counseling were followed up for 6 to 23 months after testing. Of those patients found to be HIV seronegative, 8.8% were subsequently diagnosed with a definite STD (syphilis, gonorrhea, or trichomoniasis); 10.2% returned with a probable STD (nongonococcal urethritis or pelvic inflammatory disease); and 3.3% reported having had an STD-infected partner during the posttest period.

The objective of this study was to determine whether HIV counseling and testing decreased the incidence of STDs in a group of high-risk adolescents. We also sought to find out whether self-reported condom use was correlated with the acquisition of STDs over time.

**RESULTS**

The study group consisted of 118 female (79%) and 31 male (21%) adolescents. The mean age was 16.15 years for the female subjects and 17.19 years for the male subjects. Most (97%) of the subjects were African American (Table 1). These percentages correspond to the demographics of the adolescents in the larger HIV seroprevalence study sample. The reported condom use at initial enrollment was 24% for the frequently/always (F) group, 40% for the sometimes (S) group, and 36% for the rarely/never (R) group. The demographics of each condom use group were similar for mean age, reason for enrollment, ethnicity, and risk behaviors other than sexual such as smoking, alcohol use, and marijuana use. Male adolescents were less likely to report using condoms rarely/never (males made up 30.9% of the F, 25% of the S, and 9.4% of the R groups). Each group became sexually active at approximately 13 to 14 years of age. Subjects in the S group had a greater number of partners in the past 12 months at the time of enrollment than did those in the F or R groups (Table 2). Subjects in each group also had a similar number of partners during the follow-up period; ANOVA results were 2.24±2.45 for the F group; 2.91±4.62 for the S group; and 3.83±12.26 for the R group; P>.05.

Of the original 149 patients, 126 (85%) returned for their follow-up assessment within 1 year of enrollment in the original CDC study. All of the subjects reported having had sexual intercourse in the intervening months after enrollment. During the pretest period, no relationships were found between reported condom use and the number of visits per month for STD diagnosis. The rates were similar for all groups by ANOVA F test (F, 1.42±0.69; S, 0.38±0.53; R, 0.34±0.52; P>.05). A paired Wilcoxon signed rank test was used to detect a difference between pretest and posttest visits per month for STD diagnosis for each group. All groups, as well as the total group, showed a slight decrease in STD diagnosis visits per month, but this difference was not significant (P>.05) (Table 3).

Of the 126 subjects who returned for follow-up, 121 (96%) responded to a question regarding condom use in the month prior to their follow-up visit. Only 8 subjects (24%) of those in the initial F group reported frequent condom use within the past month at follow-up. Moreover, 53% of all the resurveyed subjects reported using condoms rarely/never in the past month (Figure).

In this study of high-risk urban adolescents, we sought to assess whether an intervention of HIV counseling and testing, including the reinforcement of safer sex practices, has any relationship to the occurrence of STDs in 3 behaviorally related subgroups. We also wanted to show the variability in condom use over time for this population. We found that all 3 condom use groups had a history of a similar number of visits for STDs even before

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**Table 1. Demographic Features of Adolescents by Frequency of Condom Use**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Frequently/Always</th>
<th>Sometimes</th>
<th>Rarely/Never</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at initial interview, mean±SD, y</td>
<td>16.91±1.92</td>
<td>17.0±1.36</td>
<td>16.7±1.49</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Ethnicity, No. (%)</td>
<td>African American</td>
<td>35 (97.2)</td>
<td>59 (98.3)</td>
<td>50 (94.3)</td>
</tr>
<tr>
<td></td>
<td>Latino</td>
<td>1 (2.8)</td>
<td>0</td>
<td>3 (5.7)</td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>0</td>
<td>1 (1.7)</td>
<td>0</td>
</tr>
<tr>
<td>Sex, No. (%)</td>
<td>Female</td>
<td>25 (69.4)</td>
<td>45 (75)</td>
<td>48 (90.6)</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>11 (30.6)</td>
<td>15 (25)</td>
<td>5 (9.4)</td>
</tr>
</tbody>
</table>

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**Table 2. Risk Behaviors of Adolescents by Frequency of Condom Use**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Frequently/Always</th>
<th>Sometimes</th>
<th>Rarely/Never</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at 1st intercourse, mean±SD, y</td>
<td>13.31±1.92</td>
<td>13.37±2.05</td>
<td>13.87±1.59</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>No. of partners in past 12 mo, mean±SD</td>
<td>4.61±4.94</td>
<td>7.78±14.81</td>
<td>3.10±2.33</td>
<td>.009</td>
</tr>
<tr>
<td>Smokers, No. (%)</td>
<td>7 (19)</td>
<td>13 (22)</td>
<td>5 (9)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Ever used alcohol, No. (%)</td>
<td>26 (72)</td>
<td>48 (80)</td>
<td>37 (70)</td>
<td>&gt;.05</td>
</tr>
<tr>
<td>Ever used marijuana, No. (%)</td>
<td>11 (31)</td>
<td>16 (27)</td>
<td>10 (19)</td>
<td>&gt;.05</td>
</tr>
</tbody>
</table>

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**Table 3. Sexually Transmitted Disease Visits per Month Before and After HIV Testing**

<table>
<thead>
<tr>
<th>Reported Condom Use at Enrollment</th>
<th>Mean±SD Visits per Month (Median, Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Before HIV Test</td>
</tr>
<tr>
<td>Total (N=139)</td>
<td>0.37±0.56 (0.12, 0-2.0)</td>
</tr>
<tr>
<td>Frequently (n=33)</td>
<td>0.42±0.69 (0.10, 0-2.0)</td>
</tr>
<tr>
<td>Sometimes (n=55)</td>
<td>0.38±0.53 (0.13, 0-2.0)</td>
</tr>
<tr>
<td>Rarely (n=51)</td>
<td>0.34±0.52 (0.10, 0-2.0)</td>
</tr>
</tbody>
</table>

*HIV indicates human immunodeficiency virus. For all groups, P>.05 (Wilcoxon signed rank test).
HIV counseling and testing. We had expected the frequently/always condom users to have had a lower rate of STDs, yet our study found this hypothesis untrue. At the baseline, there were no significant differences between the number of visits per month for STDs for each of the 3 condom use subject groups (P<.05). Since each condom use group was similar in demographic characteristics and also in number of reported sexual partners and other risk behavior categories, the lack of a difference in STD incidence among the groups even prior to HIV testing is incongruous.

In a study by Brown et al12 of 266 teenagers in Rhode Island, the group who reported consistent condom use had begun sex, alcohol, and other drug use at a later age than did condom nonusers; our study, however, did not show such an association. The groups in our study were similar in age of initiation of sexual activity, and in whether they smoked or used alcohol or marijuana. Even among those who did smoke, there was no difference in age of initiation of smoking among the 3 groups. Still, there may have been a particular correlate of condom use that was not fully explored in our study.

While all 3 groups showed a decrease in visits per month for STDs during the follow-up period, this decrease was not statistically significant (P>.05). We conclude that HIV testing and counseling have no statistically significant effect on decreasing the incidence of STDs acquired after testing in this population of high-risk adolescents. This finding is consistent with the findings reported in the adult studies, ie, that HIV counseling and testing have no effect on risk behaviors in heterosexuals. The statistics suggest that although at-risk populations are being tested and counseled regarding safer sex and condom use, those who test negative show no significant change in risk behavior. The most important conclusion we can reach from our data is that single-dose interventions, such as the HIV counseling and testing used in the CDC study, are generally ineffective in fostering behavioral change in adolescents. It must be made clear, however, that the goal of the CDC study was an assessment of HIV seroprevalence in this adolescent population and was not specifically meant to be a risk-reduction intervention. By examining the frequency of subsequent STDs in this study group, however, we could show a lack of behavioral change after counseling and testing, pointedly illustrating how unproductive knowledge-based interventions can be for changing risk behaviors in adolescents.

Behavioral change requires more than just increased knowledge and an altered perception of risk, which is all most HIV counseling and testing programs achieve. Other studies that have examined condom use in adolescents have applied certain behavioral principles such as the theory of reasoned action or the theory of planned behavior.13-15 This work explains that attitudes toward the behavior and social norms regarding the behavior, as well as issues of self-efficacy, are at least as important as knowledge in inducing an individual to change his or her risk-related behaviors. None of these additional critical variables were included in the counseling and testing done in our study. Thus, it is not surprising that we did not find any changes in the number of STDs among those adolescents who tested negative for HIV.

Reitman et al16 evaluated predictors of risky and safer behavior in a sample of low-income African American adolescents, assessed their perceptions of the risks associated with their sexual behavior, and examined differences among adolescents who used condoms consistently, used them inconsistently, or engaged in only unprotected intercourse. That study also noted that whatever their behavior, the adolescents generally did not consider themselves at risk for HIV infection. These findings suggest that precautionary practices like condom use, and high-risk behavior like unprotected sex with multiple partners, may have different correlates.

Our study found no appreciable change in the precautionary behaviors that can prevent HIV infection in the population of adolescents we studied. In their study, Reitman and associates16 found that most of the African American youth who engaged in unprotected intercourse rated themselves as low risk, independently of their actual behavior. It seems that many youth either fail to recognize or minimize the risks associated with unprotected sexual intercourse. We theorize that our subjects may not have considered infrequent condom use directly related to an increased risk of HIV infection. Although they may know that unprotected sexual intercourse can lead to infection with HIV, teens often believe that their partner is not infected with the virus and thus is not a risk to them. This may be an example of “optimistic bias,” defined as a tendency to exaggerate the risks of others relative to one’s own risk.16,17

Van der Velde et al18 found that respondents from very high-risk samples (eg, same-sex partners or subjects with commercial sex partners) provided estimates of personal risk of HIV acquisition that were less subject to optimistic bias. For their low-risk subjects (single-partner heterosexuals), personal risk seemed to be based on the participants’ estimates of perceived HIV prevalence rather than on their personal sex practices. Thus the subjects in our study may have held such optimistic bias about their own risk of infection, especially after testing negative for HIV.

Another troublesome finding in our study was the observation that the majority (53%) of the adolescents reported using condoms rarely/never in the month prior to enrollment.
to their follow-up visit. Even in the group who initially reported using condoms frequently/always, only 24% reported continued consistent use of condoms during the month prior to their follow-up visit. This illustrates that self-reported condom use is, at best, sporadic and variable over time in this group of adolescents.

From the overall similarity of STD occurrence among the 3 condom use groups, we might not know whether the adolescents in this study actually used condoms frequently or whether they simply reported that they did. Because adolescents often receive many safer-sex messages through various educational interventions, they may feel that they are expected to report frequent condom use when they are questioned by health care providers and other adults, even if they do not practice it. They may not want to be honest with the interviewer for fear of disapproval or other negative consequences. This would be a good question to explore in further studies.

We have shown that single-dose HIV counseling and testing intervention does not seem to have an impact on altering risk behaviors for HIV infection in this group of adolescents. There are, however, some limitations of our results. One limitation is that we chose a select population of high-risk adolescents to evaluate. Although this group is at highest risk for HIV infection, the results we obtained may not be generalizable to other adolescent populations. Other sociodemographic groups of adolescents might show a decrease in risk behaviors after HIV counseling and testing.

Another limitation of this study was the small sample. We could not predict the expected effect size for the intervention of HIV counseling and testing within the 3 groups and for the total group. We expected to see a medium effect size (½ SD) between pretest and posttest. Although we had sufficient power to detect a medium effect of the intervention (total, 99%; F, 51%; S, 70%; R, 73%), we discovered on analyzing the data that we had very small effect sizes (total, 0.244; F, 0.368; S, 0.230; R, 0.175). We did not see any significant change in STD visits per month before and after HIV counseling and testing, but we lacked the power in the study to conclude that we would achieve the same results using a larger sample size. The power for the total group was 52%; for the F group, 46%; for the S group, 22%; and for the R group, 16%. The power analysis of the ANOVA used for comparison among the 3 condom use groups showed similar results. The power of our analysis was 0.258. Thus we did not have a sufficient sample size to detect a very small effect, but we did have a sample size large enough to detect a medium effect.

Human immunodeficiency virus testing and counseling is but one part of a behavioral intervention that aims at reducing risk behaviors in adolescents. Although counseling and testing alone did not reduce the risk behaviors in this group of adolescents, it is possible that repeated testing and counseling combined with continued teaching and reinforcement of safer sex practices would have a greater effect on subsequent risk behaviors over time by gradually decreasing optimistic bias. This should be the subject of further investigation.

Health care providers must continue to initiate discussion of HIV risk behaviors and sexual decision making with their adolescent patients, considering the psychosocial developmental stage of the adolescent and adapting their intervention accordingly. Routine condom use and skills-building techniques to increase self-efficacy should be vigorously reinforced at each visit. These interventions should have a better effect than single-dose knowledge-based interventions in reducing adolescent sexual risk behaviors. Clinicians have the opportunity to play a crucial role in effecting behavioral change, but this change will no doubt require a large investment of time and patience by the health care provider.

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REFERENCES