

# Predictors of Contraceptive Discontinuation in a Sexually Transmitted Disease Clinic Population

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**CONTEXT:** Women who attend sexually transmitted disease (STD) clinics are at high risk for unintended pregnancy. Little information is available, however, on the rates of discontinuation of effective contraceptive method use among this population.

**METHODS:** As part of a study on contraceptive services offered by an STD clinic in Denver, 406 clients who accepted these services in 1996–1999 were interviewed about their contraceptive practice, experience of side effects and method-use problems at baseline and at four, eight and 12 months of follow-up. Multivariate survival analysis was used to assess predictors of discontinuation of effective contraceptive use.

**RESULTS:** Twenty-nine percent of women discontinued use by the end of one year. Cox proportional hazards models show that compared with women who reported no method-use problems, those who experienced one problem were three times as likely (hazard ratio, 3.0) to discontinue effective use, and women who had at least two problems were five times as likely (5.0) to discontinue use. The experience of side effects with either a past or a current method, however, was not associated with the risk of discontinuation. Furthermore, women who reported risky sexual behavior in the year before enrollment were significantly less likely to discontinue effective method use (hazard ratio, 0.4), as were women who were covered by medical insurance or who gained such coverage during a follow-up interval (hazard ratio, 0.5 for each).

**CONCLUSIONS:** In this study population of STD clinic users, method-use problems appear to be a more fundamental issue for contraceptive compliance than the past or current experience of side effects. The unexpected association between method-use problems and the risk of discontinuation needs to be further delineated so that effective interventions addressing these problems can be developed and implemented.

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The side effects of contraceptives and the resulting discontinuation of use account for a large proportion of unplanned pregnancies in the United States.<sup>1</sup> For example, discontinuation of pill use due to its side effects is responsible for an estimated 20% of unplanned pregnancies each year.<sup>2</sup> Contraceptive discontinuation has been widely studied in a variety of settings and populations; analyses have been based on the National Survey of Family Growth (NSFG),<sup>3</sup> clinical trials evaluating particular methods,<sup>4</sup> samples of women experiencing unintended pregnancy<sup>5</sup> and a cohort of Swedish women.<sup>6</sup> Except for the research based on the NSFG, which did not ask about contraceptive side effects, all of these studies found that among women who did not intend to become pregnant, the experience of side effects was the primary reason for discontinuing use. In fact, many women who have become pregnant unintentionally have reported that they discontinued use solely out of fear of potential side effects.<sup>7</sup> Conversely, women with a history of few side effects have reported satisfaction with contraceptive use.<sup>8</sup>

The most recent evaluation of contraceptive discontinuation rates, using 1995 NSFG data, found that within six months of initiating use, 31% of women had discontinued use of a reversible method for “method-related reasons”—defined as any reason for stopping contraceptive use while still at risk of an unintended pregnancy. The specific reason for doing so (e.g., cost, ease of use or side effects) was

not ascertained by the NSFG questionnaire, however.<sup>9</sup>

Adherence to prescribed therapeutic regimens is an issue in all medical arenas, including contraception, where the consequence of noncompliance can be an unplanned or unwanted pregnancy. Contraceptive compliance may present unique complexities. Different skills are required for adherence to hormonal and coitus-dependent methods, and women know that their fertility—and thus their risk of pregnancy—is not constant. Rates of compliance with pill-taking regimens are similar to those with other prescribed medical regimens.<sup>10</sup> A review of the determinants of nonuse of the condom suggested that multiple factors are at work: Correct and consistent condom use was influenced by users’ characteristics, actual and perceived characteristics of the method, and the context of sexual behavior.<sup>11</sup>

Although women who attend sexually transmitted disease (STD) clinics are at high risk for both STDs and unintended pregnancy,<sup>12</sup> little information is available on their rates of contraceptive discontinuation. If the women in this population who are likely to discontinue contraceptive use early could be identified, measures to enhance continuation could be designed. In this article, we describe the results of a study conducted with an STD clinic population that investigated the extent to which the likelihood of discontinuation was related to the experience of side effects (with either current or past method use) and to problems

using the prescribed method. We hypothesized that women who had a history of side effects would be more likely to discontinue current use of a similar method than would women who had not experienced side effects.

## **METHODS**

### **The Sample**

Our analyses are based on data from a subcohort of women who enrolled in a randomized, controlled trial between December 1996 and December 1999. The study was carried out at a public STD clinic in Denver, which offers free, comprehensive walk-in services for the diagnosis, treatment and prevention of STDs.

Female clinic clients were eligible for the study if they were of reproductive age (13–49 years), were not currently using a contraceptive and were not trying to become pregnant. The larger study aimed to evaluate the benefits of an intervention in which a family planning nurse counseled STD clients, offered them the method of their choice and then assisted them with making an appointment to see a primary care provider for ongoing contraceptive services. Potential participants were approached when they came to the clinic for care, and those who agreed to enroll were randomly assigned either to receive the intervention or to serve as a control; women in the control group were counseled about possible contraceptive options and the need for ongoing contraception, were provided with a one-month supply of condoms and foam, and were offered standard information about clinics and providers to contact for contraceptive services.

All participants were provided with condoms and spermicides at their initial STD clinic visit, and were asked to return for follow-up interviews four months, eight months and 12 months after enrollment. Most of the interviews, which were conducted by independently trained interviewers, were person-to-person, but some were done by telephone when necessary. Participants received \$15 for each completed interview. The study was approved by the Colorado Multiple Institutional Review Board.

Our analyses included only sexually active women who had completed at least their four-month follow-up interview by April 2000, had ever used a contraceptive before enrollment (excluding withdrawal, natural family planning, emergency contraception or vasectomy) and had initiated use of an effective reversible method other than the IUD since enrollment. Of the 862 women who enrolled in the randomized controlled trial, 522 completed the four-month interview; 78% of these participants (406 women) met the study criteria and thus made up the final study sample. (Fifty-two percent of the study sample had completed all three follow-up interviews, 9% missed the eight-month interview only, 21% missed the one-year interview only and the remaining 17% missed the eight- and 12-month interviews.)

### **Variables**

All women completed a routine STD evaluation questionnaire and filled out a baseline study questionnaire with items about previous contraceptive and condom use; previous

method-associated side effects; demographic characteristics; sexual history; reproductive history; and attitudes toward contraception, condoms and pregnancy prevention. Each follow-up interview contained questions on events occurring during the previous four-month interval. These follow-up interviews asked about the frequency of method use (including condoms) and of side effects or problems associated with using the method, about whether the woman had become pregnant or received an STD diagnosis, and about her attitudes toward contraceptive use and pregnancy prevention.

Our primary outcome of interest was whether women discontinued use of an effective reversible contraceptive method over the one-year follow-up period. We defined the following as effective reversible methods: the pill, the injectable, the implant, the diaphragm, male or female condoms, spermicides and the cervical cap. We considered use to have been effective during a follow-up interval when a woman reported having used one or more of these methods at more than 75% of acts of coitus. If a woman used an effective method at 75% or fewer acts of intercourse, we classified her as having discontinued effective contraceptive use. We decided on this definition of effective contraceptive use on the basis of an analysis of the subgroup of 380 women who returned for all follow-up visits; those data showed that the pregnancy rate increased when mean contraceptive use dropped below 75%.

When research evaluates the relationship between the experience of effects in the past and the risk of discontinuing current use, the specifics of both past and current methods need to be considered. For this part of our analysis, we categorized contraceptive methods as either hormonal (the pill, the injectable and the implant) or coitus-dependent (the diaphragm, male or female condoms, spermicides and the cervical cap). We defined the participant's current predominant type of method as the method category used most frequently during the follow-up interval. If a woman used hormonal and coitus-dependent methods with equal frequency, we referred to her as a dual-method user. Previous methods were quantified as the number of different hormonal methods and of different coitus-dependent methods used prior to enrollment.

We hypothesized that having experienced side effects with a method would be the primary predictor of discontinuation. To account for the influence of previous side effects on current discontinuation, we classified this predictive variable by the current predominant method category. Thus, we defined prior side effect experiences as the number of side effects\* experienced when using prior methods in the predominant-method category, divided by the number of different methods ever used in that category. We defined current side effects as the number of reported side effects with any hormonal or coitus-dependent method used

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\*The contraceptive side effects enumerated in this category are allergies, breast problems, cognitive changes, local or generalized discomfort, weight gain or bloating, emotional symptoms, vaginal infections, menstrual changes, nausea, headache or other neurologic changes, pain, effects on sexual satisfaction and skin disorders.

**TABLE 1. Percentage distribution of female sexually transmitted disease clinic clients and cumulative percentage who discontinued effective method use after one year, by selected demographic characteristics at baseline; and percentage who ever used contraceptives and who experienced side effects, and cumulative discontinuation rates, by method, Denver, 1996–1999**

Characteristic	All women (N=406)	Cumulative % who discontinued after one year
<b>% DISTRIBUTION</b>		
<b>Age</b>		
13–17	18.9	30
18–20	29.0	32
21–23	23.1	22
≥24	28.8	32
<b>Race/ethnicity</b>		
White	37.9	32
Black	27.4	25
Hispanic	29.8	31
Other	4.9	30
<b>Marital status</b>		
Never-married	87.4	29
Married	5.5	31
Divorced	7.0	22
<b>Education</b>		
<high school	39.9	32
≥high school	60.0	24
<b>Working</b>		
Yes	62.3	31
No	37.6	26
<b>Has public or private medical insurance</b>		
Yes	30.5	22
No	69.4	33
<b>No. of births</b>		
0	64.0	39
1–3	32.3	26
≥4	3.6	20
<b>Perceived likelihood of pregnancy in next year</b>		
Not at all likely	68.2	27
Slightly to extremely likely	31.7	34
<b>Risky sexual behavior in past year*</b>		
Yes	9.1	15
No	90.8	30
<b>Study arm</b>		
Intervention	50.7	28
Control	49.2	32
Total	100.0	29
<b>PERCENTAGE</b>		
<b>Ever used</b>		
Pill	56.8	30
Injectable	28.5	27
Implant	5.4	22
Male condom	95.8	29
Diaphragm	1.4	34
Spermicides	14.2	33
<b>Ever had side effect†</b>		
Pill	22.5	30
Injectable	73.2	23
Implant	90.9	25
Male condom	20.3	31
Diaphragm	100.0	34
Spermicides	22.4	54

\*Risky sexual behavior was defined as having exchanged sex for money or drugs, or having had a sexual partner who was gay or bisexual, was a commercial sex worker, injected drugs or was HIV-positive. †Percentages are based on women who have ever used each method. Note: For the distribution by marital status, data are missing for seven women.

during each four-month follow-up interval.

We calculated a method-use problem score at each follow-up interview by counting the number of problems\* that were reported as occurring sometimes, often or very often in the previous interval. Other variables of interest were the frequency of sexual intercourse over the follow-up interval, whether the woman had switched methods in that time period, her perceived likelihood of a pregnancy during the subsequent year and whether she had had any high-risk sexual encounters in the year before enrollment (i.e., she had exchanged money or drugs for sex, or had had sexual contact with a partner who was gay or bisexual, was a commercial sex worker, injected drugs or was HIV-positive).

### Analytic Approach

We fitted Cox proportional hazards with a discrete model of time to discontinuation for each follow-up visit using SAS version 6.12 software. For participants who had completed only the four- and 12-month interviews, women discontinuing effective contraceptive use at 12 months were censored at four months, while those continuing effective contraception at the 12-month follow-up were censored at 12 months. Women who became pregnant were censored in the interval in which the pregnancy was reported. Censoring thus removed participants who may have discontinued—or may not have discontinued—in the interval prior to pregnancy, and beyond which their discontinuation status is unknown.

We entered into the final model variables with a p-value of less than .20 at the univariate level, as well as variables that we considered clinically relevant or that have an established relationship with the likelihood of discontinuation.<sup>13</sup> Thus, we entered the following baseline variables into the final model: age, race or ethnicity, marital status, education, work status, parity, contraceptive methods used in the past and the woman's perception of the likelihood of a pregnancy within the next year.

This last variable was considered to be time-varying, and was assessed at each follow-up interview as well. The other time-varying variables entered into the final multivariate model were side effects and current method-use problems, insurance status, predominant type of current method, how many times the woman had changed that method type, how frequently she was having sex, and the total number of sexual partners and of new sexual partners she had had within the past four months. Finally, we also considered as a time-varying variable the side effects a woman had experienced with a prior method, since these responses were linked to the predominant type of current method.

Five interaction terms were tested: study arm (i.e., in-

\*Method-use problems include forgetting to carry contraception, having difficulty using the method correctly, "getting caught up in the moment," having a partner who refuses to use a contraceptive, feeling embarrassed about obtaining a method, having a partner who feels embarrassed about obtaining a method, having difficulty finding or buying a birth control method, running out of supplies of the method, misplacing the method, being high on drugs or alcohol, and being unable to afford or unwilling to spend money on a method (source: reference 18).

tervention or control) by method-use problems, method-use problems by current method type, method-use problems by method switching, method switching by prior experience of side effects and method switching by current side effects.

## RESULTS

### Descriptive Analyses

The median age of the 406 study participants was 21 years (range, 13–48), with 29% each being aged 18–20 and aged 24 and older; 21–23-year-olds and 13–17-year-olds accounted for smaller proportions of the total sample (23% and 19% respectively—Table 1). Thirty-eight percent of the women were white, 27% were black, 30% were Hispanic and 5% were of other races or ethnicities. At the time of enrollment, the majority had never married (87%), lacked health insurance (69%), had never given birth (64%), were currently working (62%) and had graduated from high school (60%). Moreover, 9% of the sample had engaged in risky sexual behavior in the past year.

At the time of enrollment, 36% of the STD clients had had at least one pregnancy, and 48% of these had ever had an abortion (not shown). When asked to recall their feelings about their most recent pregnancy, 75% indicated that the pregnancy was unwanted at conception, and 80% said that the pregnancy was mistimed. (Over the full year of follow-up, 85 pregnancies occurred.)

Almost all 406 women reported having ever used the condom (96%). Although 57% had ever taken the pill, lower proportions reported ever having used other hormonal methods—29% the injectable and 5% the implant. Overall, 60% of the sample reported having experienced a side effect with a previously used method (not shown).

Approximately 20% of participants reported side effects with their current method at each follow-up interview (not shown). The proportions reporting specific side effects were 24% for weight gain; 23%, menstrual changes; 16%, neurologic symptoms; 16%, discomfort, such as fatigue or genital irritation or burning; 15%, nausea; 9% each, emotional disorders and skin disorders; and 5%, breast pain.

The current method-use problems that were most frequently reported at all three interviews were getting caught up in the moment (14–16%), forgetting to carry the method (10–12%), having a partner who did not want to use a contraceptive (8–10%) and running out of method supplies (7–10%). At each follow-up interview, these problems were significantly more likely ( $p<.05$ ) to have occurred among women who were using a coitus-dependent method than among those using either a hormonal method or dual methods. However, there was no interaction between the number of method-use problems and the predominant type of current method.

Overall, the cumulative discontinuation rate of effective contraceptive use was 29% for the 12-month follow-up period. Seventeen percent of women had discontinued use of an effective method by four months, another 7% by eight months and an additional 5% by 12 months. This general

**TABLE 2. Hazard ratios (and 95% confidence intervals) from univariate Cox proportional hazards models showing the association between the risk of discontinuing effective method use and selected time-varying characteristics**

Characteristic	Hazard ratio	p-value
<b>No. of side effects with method used in past*</b>		
0 (ref)	1.00	
1	0.60 (0.35–1.02)	.061
2	0.71 (0.27–1.85)	.481
≥3	1.15 (0.38–3.51)	.800
<b>No. of side effects with current hormonal method</b>		
0 (ref)	1.00	
≥1	0.84 (0.63–1.11)	.211
<b>No. of side effects with current coitus-dependent method</b>		
0 (ref)	1.00	
≥1	1.12 (0.77–1.62)	.563
<b>No. of problems using current method†</b>		
0 (ref)	1.00	
1	3.00 (1.66–5.39)	<.001
≥2	4.75 (3.00–7.50)	<.001
<b>Predominant type of current method</b>		
Hormonal	2.26 (0.76–6.74)	.145
Coitus-dependent	2.94 (1.04–8.34)	.043
Dual‡ (ref)	1.00	
<b>No. of times switched methods§</b>		
0	0.93 (0.55–1.58)	.794
1	0.87 (0.51–1.47)	
2	0.81 (0.48–1.37)	
<b>Frequency of sex§</b>		
1–3 times per mo.	1.16 (1.00–1.34)	.047
1 time per week	1.34 (1.16–1.55)	
≥2 times per week	1.56 (1.35–1.80)	
<b>No. of partners§</b>		
1	1.43 (0.95–2.15)	.089
≥2	2.04 (1.35–3.08)	
<b>No. of new partners§</b>		
0	1.05 (0.79–1.38)	.743
1	1.10 (0.83–1.45)	
≥2	1.15 (0.87–1.52)	
<b>Perceived likelihood of pregnancy in next year</b>		
Not at all likely	0.61 (0.41–0.91)	.016
Slightly to extremely likely (ref)	1.00	

\*The sum of the number of side effects associated with past use of hormonal, coitus-dependent or dual methods divided by the number of methods of that specific type ever used; the hazard ratio is based on the current predominant method type (hormonal, coitus-dependent or dual) in that interval. †Based on the number of problems (out of a possible 11) that resulted in intercourse without the use of contraception. ‡Dual-method use defined as the use of both hormonal and coitus-dependent methods at more than 50% of recent sexual encounters. §Variable was analyzed as an ordered categorical variable; the hazard ratio thus represents the risk of discontinuation relative to that of the other respective categories for the variable. Note: ref=reference category.

pattern in discontinuation rates at successive follow-up periods was fairly consistent within all demographic and contraceptive-history subgroups.

There was no significant difference between the cumulative discontinuation rate among women who had a history of side effects (28%) and those who did not (31%). The experience of side effects with a previous method was related to ever-use of the pill ( $p=.001$ ), the injectable ( $p=.001$ ), the implant ( $p=.002$ ), the male condom ( $p=.016$ ),

**TABLE 3. Hazard ratios (and 95% confidence intervals) from multivariate Cox proportional hazards models showing the association between the risk of discontinuing effective method use and selected characteristics**

Characteristic	Hazard ratio	p-value
<b>No. of problems using current method*</b>		
0 (ref)	1.00	
1	2.99 (1.63–5.48)	.000
≥2	5.03 (3.14–8.06)	.000
<b>Had medical coverage at baseline</b>		
Yes	0.53 (0.32–0.88)	.014
No (ref)	1.00	
<b>Gained medical coverage by follow-up</b>		
Yes	0.50 (0.26–0.95)	.036
No (ref)	1.00	
<b>Lost medical coverage by follow-up</b>		
Yes	1.41 (0.66–3.02)	.379
No (ref)	1.00	
<b>Risky sexual behavior in year before enrollment</b>		
Yes	0.36 (0.15–0.88)	.025
No (ref)	1.00	
<b>Study arm</b>		
Intervention	0.90 (0.59–1.36)	.604
Control (ref)	1.00	

\*Based on the number of problems (out of a possible 11) that resulted in intercourse without the use of contraception. Notes: Model controlled for all of the variables listed in Table 1 (except for perception of pregnancy in next year), plus the following time-varying variables: side effects with current method, new and total number of sexual partners in the past four months, frequency of sexual intercourse, predominant type of current method, number of coitus-dependent methods used before enrollment, number of hormonal methods used before enrollment, cumulative number of method switches, insurance coverage and problems using current contraceptive method. Note: ref=reference category.

the diaphragm ( $p=.044$ ) and spermicides ( $p=.003$ ). Previous use of any specific method was not significantly related to the likelihood of discontinuation.

### Hazards Analyses

According to the univariate Cox proportional hazards analysis, two baseline variables were related to the risk of discontinuing effective contraceptive use (not shown). The number of side effects experienced with pill use in the past increased the risk of discontinuation (hazard ratio, 1.2; 95% confidence interval, 1.0–1.5); on the other hand, having medical insurance at the time of enrollment lowered the risk of stopping effective use (0.6; 95% confidence interval of 0.4–1.0).

At the univariate level, several time-varying variables significantly increased the risk of discontinuation—having problems using one’s current method, predominantly using a coitus-dependent method, having had two or more partners and having intercourse at least weekly (Table 2, page 149); in contrast, the perception that a pregnancy was “not at all likely” in the upcoming year significantly lowered women’s risk of discontinuing effective contraceptive use. However, neither past nor current side effects were relat-

ed to discontinuation. Moreover, just 2–3% of women reported an incident STD infection at each follow-up,\* and such a diagnosis was not associated with the risk of discontinuation (not shown).

In the fully adjusted multivariate Cox proportional hazards model, women having just one problem using their current method were three times as likely to discontinue effective use (hazard ratio, 3.0), and those having two or more problems were five times as likely to stop use (5.0), as were women who were experiencing no problems (Table 3). Furthermore, women covered by medical insurance at baseline were only about half as likely to discontinue use as were those who lacked coverage at enrollment (0.5); similarly, women who had gained insurance coverage by one of the follow-up interviews were also less likely to drop effective use than were women who ultimately never had coverage (0.5). In addition, women who had engaged in at least one risky sexual behavior during the year before enrollment were less likely to discontinue effective use than were women who did not report any such risky behavior (0.4).

### DISCUSSION AND CONCLUSIONS

In this cohort study, we evaluated predictors of contraceptive discontinuation—defined as using an effective method during 75% or fewer acts of coitus—among women who presented at an STD clinic and were enrolled in a study to assess how STD clinics could offer family planning services. Our most significant finding—that neither current nor previous experience of side effects was associated with the likelihood of contraceptive discontinuation—differs from results of prospective studies conducted within community family planning clinics and health maintenance organizations.<sup>14</sup> Furthermore, although we had not hypothesized as such, we found that method-use problems increased the risk of discontinuation, whereas medical insurance coverage and risky sexual behavior in the year preceding enrollment decreased that likelihood.

Our study’s cumulative 12-month discontinuation rate of 29% is lower than that derived from the 1995 NSFG, which found that 44% of women discontinued for “method-related reasons.”<sup>15</sup> However, our lower rate is unsurprising for several reasons. First, to ensure that our study was conducted among women who would be at risk of discontinuing use (i.e., were using a method), we limited inclusion to those women who had completed at least the first follow-up interview, where we had the opportunity to ask about—and thus ensure—method initiation. Some of the women who were excluded because they missed the first follow-up ( $N=330$ ) had probably initiated, and subsequently discontinued, method use.

Further, whereas analyses based on the NSFG have categorized method switching as discontinuation,<sup>16</sup> we did not consider it as such if the succeeding method was also an effective method and was used at an effective frequency. Moreover, we found no significant relationship between method switching and the likelihood of discontinuation.

Quantifying contraceptive use is difficult, and typically

\*Diagnosis of *Neisseria gonorrhoea*, *Chlamydia trachomatis*, HIV or *Treponema pallidum* infection.

researchers consider a woman to be practicing contraception if she reports use of a method (by herself or her partner) during the previous month.<sup>17</sup> This definition does not take into account that fertility is cyclical, that many women use combinations of methods of varying reliability, and that women's method choice can change over time and across partners.<sup>18</sup> Thus, a limitation to relying on this definition is that its precision varies depending on the method used (e.g., condom vs. injectable).

Other researchers consider contraceptive use to be effective if a woman reports that the proportion of protected sexual encounters is at least one-half.<sup>19</sup> In our study, we designated "effective contraceptive use," based on empirical evidence, to mean use of an effective method, or a combination of effective methods, at more than 75% of sexual encounters during a follow-up interval.

Although the majority of our participants (60%) had experienced contraceptive side effects in the past, these experiences did not contribute to women's likelihood of discontinuing current use of a method. Similarly, the current experience of side effects did not contribute significantly to the risk of discontinuation, although approximately 20% of participants reported side effects at each follow-up. In a review of compliance with therapeutic regimens prescribed by physicians, the occurrence of side effects did not substantially affect patient compliance or necessarily result in noncompliance.<sup>20</sup>

Prior studies on discontinuation have been limited by their tendency to elicit information on side effects only from women who discontinued contraceptive practice, so data are lacking on those who continued using their method.<sup>21</sup> One study of the predictors of implant discontinuation did inquire about side effects regardless of whether women ultimately stayed with the method; it found that women with menstrual side effects were no more likely to request removal than were those who had no side effects.<sup>22</sup> Furthermore, few studies have considered side effects in predictive models, and when they have, the definitions of what constitutes side effects have been inconsistent.<sup>23</sup>

Although a poor understanding of how a method works often leads to poor contraceptive compliance, some studies support our finding of an association between discontinuation and method-use problems; that research suggests that supportive measures can improve compliance by eliminating barriers to use rather than only by enhancing knowledge about the method.<sup>24</sup> For example, in a prospective study on pill use among women seeking services in a variety of clinical settings, method-related problems (e.g., feeling that the pill was "too hard to use" or "too expensive") were often cited as reasons for discontinuation.<sup>25</sup>

Still other studies have found that lower income is predictive of discontinuation both of pill use in particular<sup>26</sup> and of any method in general;<sup>27</sup> these findings suggest that affordability and accessibility are problems. The issue of nonuse was further highlighted in focus-group research of structural barriers to women's use of contraceptives.<sup>28</sup> In that research, several barriers to getting and using the pill

emerged (including forgetting to take it, needing a physical exam, feeling embarrassed, being unable to buy it over the counter, inconvenient clinic hours and transportation issues). Barriers specific to condom use included embarrassment with buying condoms, decreased spontaneity of sex, the partner's dissatisfaction with the method and cost. These results are consistent with our finding that method-use problems were an important issue for women who primarily used coitus-dependent methods.

The protective relationship between medical insurance coverage and discontinuation is also unsurprising. The significance of potential method-use problems other than cost is reinforced by the consistent significance of method-use problems overall, even after medical insurance coverage was controlled for.

Another interesting finding was the inverse relationship between the risk of discontinuation and having recently engaged in risky sexual behavior. The women in our STD client population who reported such behaviors (9%) might have been more consistent than others in their use of barrier methods for STD prevention. Although the number of women in this group (37) was too small to permit further analysis, the majority (71–75%) of these women reported relying predominantly on coitus-dependent methods at each follow-up.

Our investigation had several potential limitations. First, we could not assess whether a method had been used correctly; incorrect use can contribute to method failure and to subsequent discontinuation. Second, because appropriate information was unavailable, we were unable to determine the exact sequence of discontinuation and conception. Further, censoring all pregnancies left us unable to assess the relationship between discontinuation of contraception and unintended pregnancy, as well as how contraceptive side effects might have affected that relationship. Also, because some women probably discontinued effective contraceptive use and then became pregnant during follow-up, our discontinuation rate probably is an underestimate.

Third, because this study was conducted in an STD clinic, the results may not be generalizable to all women seeking contraceptive services. However, even though the problems associated with method use may be unique to this population, providers of contraceptive services need to be aware of potential issues associated with use among similar populations.

Fourth, we could not directly assess the relationship between the problems of using specific methods and the risk of discontinuation. Thus, our ability to develop method-specific interventions, which might improve compliance, is limited. Finally, the power to detect a difference in the risk of discontinuation by the experience of side effects with a method in the past was limited; nevertheless, the observed difference in discontinuation between women who did and those who did not have earlier side effects was too small (three percentage points) to be of clinical interest. In any event, the optimal way to assess the impact of side effects needs to be clarified and standardized.

Despite these limitations, we found that the strongest predictor of discontinuing effective contraceptive use was experiencing problems using a method; the experience of side effects did not predict discontinuation. This suggests that clinicians can encourage more consistent use by providing short-term follow-up that would actively address individual method-use problems. A better understanding of why method-use problems occur and how specific types of methods influence the risk of discontinuation would enhance the development and implementation of additional preventive measures.

## REFERENCES

- Price SJ et al., Use of contraception in women who present for termination of pregnancy in inner London, *Public Health*, 1997, 111(6):377–382; Savonius H, Pakarinen P and Kajanoja P, Reasons for pregnancy termination: negligence or failure of contraception? *Acta Obstetrica et Gynecologica Scandinavica*, 1995, 74(10):818–821; and Clark JB, Holt VL and Miser F, Unintended pregnancy among female soldiers presenting for prenatal care at Madigan Army Medical Center, *Military Medicine*, 1998, 163(7):444–448.
- Rosenberg MJ, Waugh MS and Long L, Unintended pregnancies and use, misuse and discontinuation of oral contraceptives, *Journal of Reproductive Medicine*, 1995, 40(5):355–360.
- Trussell J and Vaughn B, Contraceptive failure, method-related discontinuation and resumption of use: results from the 1995 National Survey of Family Growth, *Family Planning Perspectives*, 1999, 31(2):64–72 & 93; and Hammerslough CR, Characteristics of women who stop using contraceptives, *Family Planning Perspectives*, 1984, 15(1):14–18.
- Rosenberg MJ and Waugh MS, Oral contraceptive discontinuation: a prospective evaluation of frequency and reasons, *American Journal of Obstetrics and Gynecology*, 1998, 179(3):577–582; Sangi-Haghpeykar H et al., Experiences of injectable contraceptive users in an urban setting, *Obstetrics & Gynecology*, 1996, 88(2):227–233; Polaneczky M et al., Early experience with the contraceptive use of depot medroxyprogesterone acetate in an inner-city clinic population, *Family Planning Perspectives*, 1996, 28(4):174–178; Sivin I et al., Levonorgestrel capsule implants in the United States: a 5-year study, *Obstetrics & Gynecology*, 1998, 92(3):337–344; Kalmuss D et al., Determinants of early implant discontinuation among low-income women, *Family Planning Perspectives*, 1996, 28(6):256–260; Suman VJ et al., Levonorgestrel contraceptive implants in female patients 14 to 21 years old, *Mayo Clinic Proceedings*, 1998, 73(1):10–16; O'Dell CM et al., Depot medroxyprogesterone acetate or oral contraception in postpartum adolescents, *Obstetrics & Gynecology*, 1998, 91(4):609–614; and Stevens-Simons C and Kelly L, Correlates and consequences of early removal of levonorgestrel implants among teenaged mothers, *Archives of Pediatric and Adolescent Medicine*, 1998, 152(9):893–898.
- Price SJ et al., 1997, op. cit. (see reference 1); Savonius H, Pakarinen P and Kajanoja P, 1995, op. cit. (see reference 1); and Clark JB, Holt VL and Miser F, 1998, op. cit. (see reference 1).
- Larsson G et al., A longitudinal study of birth control and pregnancy outcome among women in a Swedish population, *Contraception*, 1997, 56(1):9–16.
- Savonius H, Pakarinen P and Kajanoja P, 1995, op. cit. (see reference 1); and Clark JB, Holt VL and Miser F, 1998, op. cit. (see reference 1).
- Rosenberg MJ, Waugh MS and Burnhill MS, Compliance, counseling and satisfaction with oral contraceptives: a prospective evaluation, *Family Planning Perspectives*, 1998, 30(2):89–92 & 104.
- Trussell J and Vaughn B, 1999, op. cit. (see reference 3).
- Cramer JA, Compliance with contraceptives and other treatments, *Obstetrics & Gynecology*, 1996, 88(Suppl.):4S–12S.
- Beckman LJ and Harvey SM, Factors affecting the consistent use of

barrier methods of contraception, *Obstetrics & Gynecology*, 1996, 88(Suppl.):65S–71S.

- Upchurch DM et al., Contraceptive needs and practices among women attending an inner-city STD clinic, *American Journal of Public Health*, 1987, 77(11):1427–1430.
- Glei DA, Measuring contraceptive use patterns among teenage and adult women, *Family Planning Perspectives*, 1999, 31(2):73–80; Trussell J and Vaughn B, 1999, op. cit. (see reference 3); Hammerslough CR, 1984, op. cit. (see reference 3); Grady WR, Hayward MD and Florey FA, Contraceptive discontinuation among married women in the United States, *Studies in Family Planning*, 1988, 19(4):227–235; Kalmuss D et al., 1996, op. cit. (see reference 4); O'Dell CM et al., 1998, op. cit. (see reference 4); and Stevens-Simons C and Kelly L, 1998, op. cit. (see reference 4).
- Rosenberg MJ and Waugh MS, 1998, op. cit. (see reference 4); and Sangi-Haghpeykar H et al., 1996, op. cit. (see reference 4).
- Trussell J and Vaughn B, 1999, op. cit. (see reference 3).
- Ibid.
- Ibid.
- Trussell J and Kowal D, The essentials of contraception: efficacy, safety, and personal considerations, in: Hatcher RA et al., eds., *Contraceptive Technology*, 17th rev. ed., New York: Ardent Media, 1998; and Piccinino LJ and Mosher WD, Trends in contraceptive use in the United States: 1982–1995, *Family Planning Perspectives*, 1998, 30(1):4–10 & 46.
- O'Dell CM et al., 1998, op. cit. (see reference 4).
- Haynes RB et al., Manipulation of the therapeutic regimen to improve compliance: conceptions and misconceptions, *Clinical Pharmacology and Therapeutics*, 1977, 22(2):125–129.
- Price SJ et al., 1997, op. cit. (see reference 1); Polaneczky M et al., 1996, op. cit. (see reference 4); Sivin I et al., 1998, op. cit. (see reference 4); Larsson G et al., 1997, op. cit. (see reference 6); Davidson AR et al., Injectable contraceptive discontinuation and subsequent unintended pregnancy among low-income women, *American Journal of Public Health*, 1997, 87(9):1532–1534; and Paul C, Skegg DCG and Williams S, Depot medroxyprogesterone acetate: patterns of use and reasons for discontinuation, *Contraception*, 1997, 56(4):209–214.
- Kalmuss D et al., 1996, op. cit. (see reference 4).
- Ibid.; Rosenberg MJ and Waugh MS, 1998, op. cit. (see reference 4); O'Dell CM et al., 1998 op. cit. (see reference 4); and Stevens-Simons C and Kelly L, 1998, op. cit. (see reference 4).
- Branden PS, Contraceptive choice and patient compliance: the health care provider's challenge, *Journal of Nurse-Midwifery*, 1998, 43(6):471–482.
- Rosenberg MJ and Waugh MS, 1998, op. cit. (see reference 4).
- Trussell J and Vaughn B, 1999, op. cit. (see reference 3).
- Hammerslough CR, 1984, op. cit. (see reference 3).
- Sable M and Libbus MK, Beliefs concerning contraceptive acquisition and use among low-income women, *Journal of Health Care for the Poor and Underserved*, 1998, 9(3):262–275.

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