AN ANALYSIS OF AND INTERVENTION IN THE SEXUAL TRANSMISSION OF DISEASE

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Sexually transmitted diseases are a serious threat to the public health. Indeed, when an individual seeks medical treatment for a sexually transmitted disease, health authorities frequently attempt to identify, procure, and treat that individual's sexual contact(s). We conducted a comparative analysis of three alternative approaches to tracing the sexual partners of individuals diagnosed as having a sexually transmitted disease. The first approach involved counseling individuals ($n = 27$) infected with either gonorrhea or nongonococcal urethritis and exhorting them to procure their sexual partners for treatment. In addition to counseling, the second and third approaches involved distributing "occasion cards" for patients to use when informing sexual contacts of the need for treatment. Moreover, in the second approach, the counselor (a nurse or physician) informed infected patients ($n = 19$) that they and their partners could waive the \$3 clinic fee contingent upon the partners seeking treatment within 1 week. In the third approach, the counselor asked infected persons ($n = 19$) to accept a follow-up telephone contact if their sexual partners failed to seek treatment within 1 week. The third approach was most effective. Ninety percent of the partners identified through this approach sought treatment, versus only about 60% of the partners in the other two conditions. The third approach was also the least expensive, costing about \$2.95 to procure each partner for treatment.

DESCRIPTORS: health-related behaviors, sexual behavior, medical compliance, community behavior analysis, contact tracing

The incidence of sexually transmitted disease (STD) has increased dramatically worldwide. Even exclusive of acquired immune deficiency syndrome (AIDS), STDs are the most prevalent infectious disease in this country (Felman, 1983; World Health Organization, 1981, 1983). The Centers for Disease Control estimate that each year 8 to 10 million Americans suffer from an STD other than AIDS (Kroger & Weisner, 1981; National Institute of Allergy and Infectious Diseases, 1979).

The two most prevalent, STDs, gonorrhea and nongonococcal urethritis (NGU), present serious health complications such as epididymitis in men and cervicitis, salpingitis, and pelvic inflammatory disease (PID) in women (Felman, 1983; National Institute of Allergy and Infectious Diseases, 1980).

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PID is a particularly serious malady attributable to NGU and gonorrhea in about 50% and 25% of the cases, respectively. After just one case of PID, the risk of infertility increases seven-fold. Should a pregnancy occur, it is more likely to be ectopic (outside of uterus), inevitably terminating in a fetal death (Handsfield, 1985). Also, both gonorrhea and NGU are transmitted to infants during delivery.

These diseases burden the nation's economy. In just 1 year, \$770 million was spent to manage gonorrhea (Weisner, 1980). Such costs are trivial, however, compared to the costs incurred when STDs are not diagnosed and treated early. For example, the health costs and losses in wages attributable to PID totaled more than \$2.6 billion in 1984 and are expected to exceed \$3.5 billion by 1990 (Washington, Arno, & Brooks, 1986).

Although containment of gonorrhea and NGU is a priority for the public health systems in many countries, this task is complicated by an especially insidious characteristic of both diseases: They may remain asymptomatic for a period during which

infected individuals may unwittingly infect others. In fact, evidence indicates that NGU among females is asymptomatic in a majority of cases (Felman, 1983; Sanders, Harrison, & Washington, 1986). If the transmission of these diseases is to be curtailed, upon discovery of an infected individual it is imperative to identify and treat that individual's sexual contact(s). These sexual contact partners should be treated epidemiologically, that is, regardless of whether symptoms or pathology is evident in the sexual contact (U.S. Department of Health and Human Services, 1982; Washington, 1984; Weinstein, 1984).

Laws in each of the United States require public health agencies to attempt to trace contacts of patients diagnosed as having gonorrhea or syphilis. However, tracing has not been required for cases of NGU. This is attributable to some peculiarities historically associated with its diagnosis. Specifically, although there is an affirmative basis for the diagnosis of gonorrhea (i.e., available to the physician are several techniques to detect gonococci), until recently, a specific infecting organism had not been isolated in the case of NGU. Thus, its diagnosis was a matter of inference when gonorrhea-like symptoms were evident in the absence of gonococci; hence, the term nongonococcal urethritis. Only recently has an infecting organism, *Chlamydia trachomatis*, been isolated in about 50% of NGU cases (National Institute of Allergy and Infectious Diseases, 1980). The laboratory technology for culturing *Chlamydia* is quite expensive and not presently available or affordable at every clinic.

As a consequence, studies of methods for conducting contact tracing have been limited to cases of gonorrhea and syphilis. Most studies were conducted at public health or STD clinics in the course of fulfilling legal obligations and often lacked precise measurement and/or appropriate controls for threats to internal validity. For example, Jamison and Mueller (1979) compared two approaches involving either an "epidemiological interview" or a "motivational interview" with the infected patient. In the epidemiological interview, patients were asked to identify sexual contacts. However, health au-

thorities assumed responsibility for notifying these contacts. In the motivational interview, patients themselves were asked to inform partners of the need to seek treatment. The comparison between these approaches was based on reinfection rates for the originally treated patient. The assumption was that these patients would continue sexual relations with the same contacts and become reinfected unless those contacts were treated. A statistically significant difference in reinfections only among males favored the motivational interview.

Atwater (1974) reported an increase in clinic attendance associated with a change from a tracing approach similar to the epidemiological interview to one similar to the motivational interview. Potterat and Rothenberg (1977) reported an equivalent number of contacts seeking treatment under two tracing conditions. One involved a 15- to 20-min interview in which a counselor attempted to solicit the names of contacts from infected patients; the other involved a shorter interview (5 min) during which a "contact slip" (of unspecified content) was handed to the patients to give to their contacts. Judson and Wolf (1978) gave gonorrhea patients a "contact card" that exhorted them to bring their partners for treatment and assured them that the patient's identity would not be revealed. This approach produced as many contacts as the more labor-intensive and costly approach in which the health authorities themselves assumed responsibility for contacting patients.

Applied behavioral studies of prompts and incentives to promote cooperation with medical regimens may be germane to developing effective contact tracing programs. For example, in a study of parents seeking dental care for their children, multiple preappointment prompts (involving an appointment card and two telephone calls) produced high levels of appointment keeping (Reiss & Bailey, 1982). An incentive, consisting of a coupon for \$5 or an equivalent gift item, also effectively promoted appointment keeping but was more costly to administer. Rice and Lutzker (1984) reported that incentives, in the form of reduced or waived fees for service, resulted in high levels of appointment keeping among parents of children scheduled for

follow-up care at a family practice clinic. A condition in which parents received an appointment card was not effective.

These studies suggest that a combination of prompts and/or incentives may contribute to an effective program for tracing sexual contacts. However, contact tracing presents some challenging variations on the problem of appointment keeping. First, health authorities do not have direct access to the target subject (i.e., the sexual contact) who needs to make and keep a medical appointment. Thus, all contingencies must be mediated by the infected patient who initially receives treatment. Second, even if the patient identifies sexual contacts by name, health authorities are not obligated legally to conduct tracing in cases of NGU. Some health authorities may even regard direct communication with an NGU contact as an intrusion. Finally, the precise measurement of the impact of contact tracing programs depends upon the willingness of infected patients to provide names of contacts. Without such identifying information, it is not possible to attribute mere increases in clinic attendance to a tracing program mediated by the infected patient.

We studied three approaches to contact tracing at a university clinic. These approaches involved combinations of prompts, incentives, and varying degrees of participation by the patients themselves.

METHOD

Subjects and Setting

We conducted the study at the health service of a large midwestern university. The study was reviewed and approved by the university's Committee for Research Involving Human Subjects. Six full-time physicians, 20 nurses, and approximately six student workers staffed the service between 8:00 a.m. and 4:30 p.m., Monday through Friday. Services were provided by appointment or emergency. Each visit cost \$3.

We selected subjects from 117 students diagnosed with gonorrhea or NGU. Two refused to participate in the contact tracing program. Fifty were excluded from the study when they reported

that their partner(s) were not university students. (Tracing such partners was neither possible nor permitted at the health service.) Eligible subjects ($n = 65$) were categorized as original patients and were individuals (a) whose stated reason for seeking treatment was either the presence of symptoms or the fact that a health authority had notified the student of the need for treatment upon discovering (e.g., during a gynecological examination) a positive culture for gonorrhea and (b) who reported having at least one sexual partner during the previous 6 weeks who also was a student at the university. (The 6-week interval was a standard recommended by authorities at the health service.)

Five of these original patients had been identified previously as the sexual partners of other original patients. We treated them as original patients (i.e., included them in contact tracing) because they identified additional individuals with whom they had had sexual contact during the previous 6 weeks.

The 65 original patients consisted of 17 females and 48 males; most (80%) were between 18 and 23 years of age. Their stated reasons for seeking medical treatment were the presence of symptoms ($n = 51$), a prompt by a sexual partner ($n = 8$), or notification from the university health service ($n = 4$) or other health authority ($n = 2$) of a positive culture.

Experimental Procedures

Counseling only. Four female nurses and two male physicians (one was the second author) conducted counseling sessions. Physicians conducted counseling in their offices; nurses accompanied the patient to a private area set aside for this purpose. Typically, counseling immediately followed the physical examination and diagnosis of the STD. In a few cases, counseling followed the discovery of a positive culture for gonorrhea. Cultures were prepared within 48 hr of the initial examination. The health service immediately contacted these patients and arranged an appointment for treatment and counseling at the patient's earliest convenience.

Counselors followed a written protocol that prompted them to ascertain the patient's reason for seeking treatment (e.g., noticed symptoms), inform

the patient of the nature and treatment of the STD, obtain the names of sexual partners during the previous 6 weeks, ask the patients to procure their partners for treatment, assure the patient of the confidentiality of all information obtained both during the examination and counseling session, and to assure him or her that the health service would not contact the partner(s). Twenty-seven original patients participated.

Counseling, occasion cards, and incentive. Patients assigned to this condition received the counseling described above. In addition, counselors told patients that if they successfully recruited their partners for treatment at the health service, then the health service would waive the \$3 charge for the visit for both the patient and partner. Counselors then presented original patients with a selection of three cards that could be accepted in any quantity or combination. The three cards, attractively designed as occasion cards (in the Hallmark and Skinnerian traditions), differed primarily in the nature and font (e.g., cursive vs. block lettering) of the opening messages in order to reflect possible variations in the relationship between original patients and partners. Thus, one card represented a "caring lover," another an "anonymous lover," and another a "matter-of-fact lover." For example, the message on the "caring lover" card (depicted in Figure 1) began, "This is not easy to say, but because I care about you . . ."; the anonymous lover card began, "We don't know each other well but" The inside of each card described the particular STD in question (either gonorrhea or NGU) and exhorted the recipient to seek treatment (without specifying where). Counselors suggested to the patients that the cards could be used in preparing to speak to partners or simply could be given to partners. Nineteen original patients participated in this condition.

Counseling, occasion cards, and follow-up telephone call. Patients were counseled and given the occasion cards as in the former condition. However, no financial incentive was offered. Rather, counselors told each patient that if the partner(s) did not arrive at the health service within 5 working days, then a professional (of the same sex as the patient) affiliated with the health service would

contact him or her (the original patient) by telephone to ask if the partner(s) had been notified. Patients were asked to consent to this call, to specify suitable times of the day to receive it, and were told the name of the specific individual who would call them. Nineteen original patients participated in this condition. (Two of these refused to be called, but their partners arrived for treatment within 5 days.)

Experimental Design

The counseling-only condition lasted for 6 months (July through December 1984). Counseling/cards/incentives and counseling/cards/follow-up conditions were implemented concurrently during the next 6 months (January through June 1985). During this latter period, subjects were assigned to these two conditions randomly. That is, protocols appropriate to each condition in equal numbers were provided each counselor. Thus, for any particular patient, the counselor simply removed the next protocol from the randomly ordered set and conducted the intervention accordingly.

Integrity of Interventions

Precautions were taken to ensure that the procedures appropriate to each condition were followed. Specifically, the protocols were color-coded. In addition, we conducted a meeting at the start of the study to discuss its purpose with counselors and to emphasize the importance of adhering to experimental procedures. Just prior to beginning the counseling/cards/incentives and counseling/cards/follow-up conditions, we held a brief (15- to 20-min) training session with each counselor during which we role-played the part of a minimally responsive patient so that the counselor could practice providing reassurance while firmly soliciting the desired information. We continued to meet with counselors approximately every 2 weeks to review the results of contact tracing efforts and to consider any problems that arose. In addition, the senior author collected completed protocols each day and was available to address any issues.

Finally, during the experimental phase a questionnaire was attached to each counseling protocol.

Outside front
cover

This is not easy to say, but

because I care about you....

Inside cover

I must tell you that I have been treated for a Sexually Transmitted Disease. This means that you need treatment too, even though you may have no symptoms. This disease may show no signs for a long time and your body can be harmed before it ever does show signs. Therefore, it is important for you to get medical attention as soon as you can.

What is important to me is our relationship and your welfare.

Please get treatment.

fold

I was diagnosed as having the condition below. The doctor gave me this information to pass to you so that you understand how important it is for you to seek treatment.

Gonorrhea is an infection of the cervix or the urethra and may produce discharge in persons of either sex. There is a carrier state which may be completely without symptoms. Gonorrhea is usually treated with a single dose of penicillin although this is often followed with tetracycline. Gonorrhea may produce pelvic inflammatory disease in the female and so it is especially important that sexual partners be treated regardless of whether a medical evaluation suggests abnormality. All persons who have gonorrhea need a repeat culture one week after completing treatment to ensure that the organism is eradicated.

Inside bottom
half

IF YOU ARE AN SIU STUDENT PLEASE PRESENT THIS CARD TO YOUR PHYSICIAN AT THE HEALTH SERVICE.

Figure 1. Illustration of the occasion card for the "caring lover." Upper panel is the outside face; middle panel is the inside top half; lower panel is the inside lower half.

The questions probed whether patients had received information appropriate to each condition (e.g., \$3 waiver vs. the telephone call). Counselors asked patients to complete the questionnaire and to drop

it in a box near the exit of the health service. Fifty-five percent of the patients responded, at least partially, to the questionnaire; 21% of the patients (in nearly equal distribution across conditions) an-

swered the question pertaining to the integrity of the particular counseling condition. All but 2 patients (one in each experimental condition) indicated that they were told and understood the terms of the particular condition.

Measurement

Identified partners seeking treatment. We ascertained the percentage of original patients who were willing to provide the name(s) of sexual contacts by reviewing the completed counseling protocols. We maintained a list of these identified partners to determine whether they arrived for treatment within 1 month of the original patient's treatment and, if so, whether they stated that their visit was prompted by an original patient. (Thus, although the patient was encouraged to have the partner seek treatment within 5 days, a partner who sought treatment within 1 month was regarded as a successful instance of tracing, provided that the partner stated the visit had been prompted by the original patient.)

There were only two instances in which the original patient could not identify a partner by full name. In both cases the apparent partners reported their visits had been prompted by an original patient. In one case that partner provided the full name of the original patient. In the second case, the original patient gave the partner's first name. A person by that name arrived during the week following the treatment of the original patient. Both cases were scored as successful instances of tracing.

Cost analysis. We calculated the costs for materials, incentives, counseling time (of nurses and doctors), and time involved in telephone contacts. These costs were then expressed as a cost per patient counseled and as a cost per partner successfully procured for treatment.

Patient satisfaction. The questionnaires used to ascertain treatment integrity included several questions to assess patient satisfaction. Patients were asked to rate (on a 5-point scale) whether they were comfortable during counseling and whether the nature of the diagnosis, means for preventing reinfection, and the importance of procuring partners were explained adequately.

RESULTS

Partners Seeking Treatment

The upper panel of Figure 2 presents the percentage of STD patients who acknowledged that a university student had been a sexual partner within the preceding 6 weeks and who provided the names of these partners. A significant difference, $\chi^2(1, 46) = 6.79, p < .01$, was found between the percentages of patients who identified their partners during counseling only (70%) versus each of the two experimental phases (100% in both conditions). Among original patients who provided names of university students, an average of 1.2 partners per patient were identified during counseling only, 1.3 in counseling/cards/incentive, and 1.1 in counseling/cards/follow-up conditions. Fifteen original patients selected the "matter-of-fact" occasion card (8 in the counseling/cards/incentive; 7 in the counseling/cards/follow-up condition). Nineteen selected the "caring lover" card (9 and 10 in the counseling/cards/incentive and counseling/cards/follow-up conditions, respectively) and 2 selected the "anonymous lover" card (1 in each condition). Two patients in the counseling/cards/follow-up condition declined to take any card.

The lower panel of Figure 2 indicates that 56% of the identified partners sought treatment during counseling only; 62% and 90% sought treatment during the counseling/cards/incentive and counseling/cards/follow-up conditions, respectively. The superiority of the lattermost approach was significant in comparison both to counseling only, $\chi^2(1, 43) = 6.01, p < .025$, and the approach involving incentives, $\chi^2(1, 44) = 4.40, p < .05$. During the counseling/cards/follow-up condition, it was necessary to call only 2 of the original patients.

Cost Analysis

Table 1 provides an itemization of costs associated with each condition, including costs for materials, incentives, and time expended by a graduate assistant in making follow-up telephone calls. The costs of time expended in counseling were determined separately for nurses and physicians on the basis of their respective mean salaries. These costs

Percentage of Original Patients Providing Partners' Names *Percentage of Identified Partners Seeking Treatment* **CONTACT TRACING CONDITION**

Figure 2. Upper panel: The percentage of original patients who reported having university students as partners and who provided partners' names during counseling only, counseling/cards/incentive and counseling/cards/follow-up conditions. Lower panel: The percentage of students who were identified as partners by original patients and were successfully traced for medical treatment during counseling only, counseling/cards/incentive and counseling/cards/follow-up conditions.

Table 1
Analysis of Costs Per Patient Counseled and Per Partner Traced

Item	Counseling only	Counseling/cards incentive	Cards/follow-up
Protocols	\$0.02	\$ 0.02	\$0.02
Cards	—	0.06	0.06
Counseling Time			
M.D. (\$0.49/min)	2.45 (5 min)	2.94 (6 min)	2.94 (6 min)
Nurse (\$0.19/min)	1.71 (9 min)	1.52 (8 min)	1.90 (10 min)
Incentives	—	4.26	—
Follow-up call	—	—	0.04
Total mean costs			
Per patient counseled			
M.D.	2.47	7.28	3.06
Nurse	1.73	5.86	2.02
Per partner traced			
M.D.	\$4.41	11.74	3.40
Nurse	3.08	9.45	2.24

were totaled and averaged across all original patients to derive a mean cost per patient counseled during each condition. These means were then divided by the proportion of partners successfully traced during each condition (i.e., .56, counseling only; .62, counseling/cards/incentives; .90, counseling/cards/follow-up) to derive a mean cost per partner traced. It is evident from Table 1 that it was not expensive to provide counseling. Counseling only cost as little as \$1.73 per patient. However, when considering the costs per partner traced, the procedures involving a follow-up telephone call were not only more effective, they were more cost efficient. Indeed, when implemented by a nurse, the cost was only \$2.24 per partner traced.

Patient Satisfaction

Patients responded affirmatively (by indicating either "agree" or "strongly agree") when asked whether they were comfortable talking to the counselor (88% of the respondents), the diagnosis had been adequately explained (93%), the means for reinfection had been discussed (90%), and the importance of procuring partners had been understood (97%).

DISCUSSION

Of the approaches to contact tracing examined in this study, the most effective involved the counselor arranging to reestablish contact by telephone with original presenting patients if their identified partners did not promptly seek treatment. In all but two cases, it was not necessary to make the follow-up telephone call. Apparently, simply making the arrangements for a contingent call was sufficient to encourage these patients to prompt their partners to seek treatment.

In comparison, counseling procedures alone were associated with moderate effects. We intended for counseling only to represent the practices at the health service at the time the study began. That is, personnel at the health service reported that they discussed the nature and treatment of the STD with original patients and exhorted them to procure their partners for treatment. However, from our discussion with health service personnel prior to the study, it was apparent that the counseling provided during the study was more extensive than preexisting practices. For instance, prior to the study, patients were not encouraged to divulge the identities of partners

for the purpose of evaluating the impact of counseling itself. Thus, it is likely that the systematized counseling procedures in this study were more potent than the preexisting counseling procedures.

Because of its encouraging results, the tracing approach involving cards and a follow-up telephone call has been continued at the health service. The approach involving monetary incentives was discontinued. Perhaps a larger incentive could achieve larger effects. However, the incentive in this study (\$3 fee waiver) was already more costly, but less effective, than the approach involving a follow-up telephone call. It is doubtful that many incentives could produce comparable effects at comparable costs vis-à-vis the approach involving the follow-up telephone call. Moreover, the follow-up telephone call procedure allows health professionals to maintain contact with original patients—perhaps the only ongoing link to a pool of infected and untreated individuals.

Inasmuch as the occasion cards were just one part of two contact tracing approaches, the individual effects of the specific card chosen cannot be determined. The inclusion of a card in the counseling/cards/incentive condition did not produce statistically significant increases over counseling only in the percentage of partners who sought treatment. Nevertheless, there may have been some effect of the cards in interaction with the approach involving a telephone follow-up. That is, each card provided a script written from the point of view of the patient communicating with the partner and thereby may have made it easier for patients to approach their sexual contacts or, at least, to pass the card to them. Whether such prompts are more apt to produce the intended effect than prompts that simply exhort the patient to procure the partner(s) for treatment (e.g., Atwater, 1974) is equivocal. In any case, the cost of the cards was negligible. Because written informational material is often standard fare at health clinics, there is probably no practical reason to isolate the effects of a card experimentally or to limit the distribution of cards in practice.

The generality of our findings is limited by several factors. For example, the counseling only condition was not concurrent with the other two con-

ditions. Moreover, we noted that counselors were more successful at soliciting the names of partners subsequent to implementing the two variations on counseling. This may have been attributable to the training sessions undertaken in preparation for these two conditions. In addition, the population itself (i.e., university students) is a relatively homogeneous one, although it should be noted that it represents the age group at greatest risk for STD, especially NGU. In fact, at student health clinics 85% of urethritis is attributable to NGU (World Health Organization, 1981). However, the particular methods involved in this study have not been applied and tested in community-based STD clinics. Such application could be important even for the university population, given that a significant portion of the initial pool of students who sought treatment for STD had nonstudents for sexual partners.

In conducting the study we began to appreciate the implications that a successful contact tracing may have in containing the problem of STDs, including AIDS. For example, one aspect of the study that was extensively debated among the health-care providers at the clinic pertained to soliciting the identity of sexual contacts. This was a particularly sensitive issue in cases of NGU because, at the time of our study, the reporting of NGU was not mandatory in any state. Some health-care providers argued their responsibilities ended with the treatment of the original patient, despite the fact that a small amount of "behavioral treatment" could ultimately protect the health of many other persons, including the original patient (by reducing the probability of reinfection).

The issue is equally sensitive for STD patients themselves, especially AIDS victims. Such persons may be concerned that any exposure of identities could compromise their civil rights (Osborne, 1988). In our study, patients trusted us not to notify their sexual contacts directly. It is unclear, in the case of AIDS, whether such assurances could either be extended by health authorities or confidently accepted by patients themselves. Perhaps this concern could be resolved by having patients or their representatives participate substantially in the management

of the health care system (Greene & Neistat, 1983). If so, such a blending of behavioral and medical technologies with regard for civil liberties may contribute significantly to the development of an effective and socially acceptable system through which the negative impact of STDs and other infectious diseases can be better addressed.

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