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Effectiveness of a Risk-Based Visitor-Prioritizing System at a Sexually Transmitted Infection Outpatient Clinic

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Objective: The objective of this study was to study the efficacy/effectiveness of a risk-based visitor-prioritizing system at a sexually transmitted infection (STI) clinic aimed to improve screening capacity by providing tailored service.

Study Design: In April 2004, a prioritizing system was implemented that classifies visitors as high or low risk depending on reported sexual behavior and previous STI events. The high- and low-risk groups are assigned to standard and short screening protocols, respectively. Both protocols include diagnostic testing for syphilis, urogenital gonorrhea, chlamydia, and optional for HIV. To assess the effectiveness of the system, differences in prevalence of STI diagnoses in the standard and short protocol were analyzed by χ^2 test.

Results: In total, 14,391 visitors (64%) received standard screening and 8,056 visitors (36%) received short screening. The STI prevalence in both groups was 18.1% and 7.6%, respectively ($P < 0.001$); prevalence of HIV was 1.8% and 0.3%, respectively ($P < 0.001$). The sensitivity of the prioritizing system was 74%. Specificity was substantially lower (42%).

Conclusions: This prioritizing system is effective in differentiating between visitors at high and low risk for STI, contributing to provision of tailored STI service, increasing efficiency, and client access to STI service.

OUTPATIENT CLINICS FOR SEXUALLY TRANSMITTED infections (STIs) are confronted with increasing visitor demands and insufficient screening capacity.^{1–5} The STI outpatient clinic of Amsterdam's Health Service offers free STI/HIV screening, counseling, and treatment. To increase the screening capacity while using similar resources, a visitor-prioritizing system was developed to provide 2 types of service. The introduction of molecular biologic tests like polymerase chain reaction (PCR) combined with noninvasive techniques enabled us to tailor our clinical testing procedures. Visitors at high risk for STI were assigned to the standard screening protocol, a service that was routinely provided to all visitors before the introduction of the prioritizing system. Visitors at lower risk for STI were assigned to a shorter screening protocol: testing for STIs (partly based on self-collected samples) with minimal counseling and no physical examination. The prioritizing system therefore does not differentiate visitors in immediate or delayed attention (as most triage systems do) but differentiates in type of service. Our intent was to increase the daily screening capacity by using resources saved on low-risk visitors. In this study, we describe our first-year experience with the visitor-prior-

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itizing system and we assess its effectiveness defined as the capacity to differentiate between high- and low-risk visitors.

Methods

Study Setting and Population

The STI outpatient clinic in Amsterdam is a nurse-led clinic that offers free STI screening and treatment. It annually performs approximately 22,000 screenings, providing 45% of the total reported STI/HIV screening in The Netherlands.⁶ A substantial part of clinic visitors belong to groups at high risk for STI in The Netherlands, including men having sex with men (MSM) and commercial sex workers.^{7,8} Most visitors attend the clinic on their own initiative, but some are referred by physicians; others are encouraged by their sexual partners or by clinic outreach activities.

Routine Clinic Operation and Integration of the Prioritizing System

The clinic generally serves visitors on a first-come first-served basis. For each visitor, social-demographic data, including date of birth, nationality, and so on, are entered into an electronic patient database by nursing staff and/or administrative personnel. Immediately after general registration, the same staff electronically activates the prioritizing system. Based on the outcome of 6 prioritizing questions (box 1), a distinction between high- and low-risk visitors is made. Visitors are accordingly assigned to a standard or short screening protocol.

Box 1: Prioritizing Questions Used at All New Visits at Amsterdam's Health Service Sexually Transmitted Infection Clinic Since June 2004.

1. Do you have STI-related physical complaints?
2. Did a sexual partner notify you of STI exposure?
3. Did you have an STI episode in the past 6 months?
4. Did you get paid for sexual contact?
5. If male, did you have sex with men?
6. If female, did you have anal sex in the past 6 months?

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Fig. 1. Visitor-prioritizing system and its screening protocols at Amsterdam's Health Service sexually transmitted infection clinic since June 2004.

Questions 1 to 5 pertain to high-risk groups for STI, whereas the last question seeks to identify women who may not be high risk but should nevertheless have anal testing for STI. If one or more questions are scored "yes," visitors are considered high risk and are assigned to the standard screening protocol. Those who answer all questions negative are considered lower risk and assigned to the short screening protocol (Fig. 1).

The standard screening protocol comprises services that were provided to all clinic visitors before implementation of the new system. Services include taking an extensive patient and sexual history, pre- and post-HIV test counseling, risk reduction counseling, and extensive physical examination (with speculscopy for women and proctoscopy for men or women reporting anal sex). For bacterial culture or PCR testing, clinic staff collects swabs from the urethra and cervix and, if applicable, from the pharynx and rectum. Blood is taken from all visitors.

The short screening protocol includes taking minimal history, collecting blood, and instructing patients in self-collection of urine (males) or a vaginal swab (females). Any visitor may be switched from the short to the standard protocol if, for example, information suggesting high-risk behavior is revealed during the short screening process.

Visitors in both groups can collect their definite results after 7 days either at the clinic or by telephone. Visitors in the short protocol who are diagnosed with an STI are requested to return for additional screening. Only those with a chlamydia or gonorrhea infection will receive the same STI screening and counseling as performed in the standard procedure. Patients with another STI diagnosed receive treatment and counseling for partner notification.

Laboratory

Laboratory procedures are described elsewhere.⁹ Briefly, in the short protocol, samples and swabs (self-collected) are tested for *Chlamydia trachomatis* and *Neisseria gonorrhea* using PCR (Cobas Amplicor CT and NG; Roche Diagnostics N.V., Switzerland). In the standard protocol, the same PCR test is used for *C. trachomatis* but cultures are used for gonorrhea (OXOID; CHOC, Germany) and *Trichomonas vaginalis* (TRITIUM, The Netherlands) testing. In both protocols, serum is tested for syphilis (*Treponema pallidum* particle agglutination assay; Fujirebio, Tokyo, Japan). The Venereal Disease Research Laboratory test (Wellcome, Dartford, England) and the FTA-absorption test (Trepo-spot IF; Biomérieux, Marcy l'Etoile, France) are performed to confirm and classify syphilis infection.

Optionally, serum is tested for HIV. In the standard protocol, a rapid HIV immunoassay (Abbott Determine HIV 1/2) is used with a result after 15 minutes. In the short protocol, the enzyme-linked immunosorbent assay (HIV 1/2; Abbott Diagnostics Division) is used. Reactive samples are confirmed by Western blot analysis (Inno-LiaTM HIV I/II Score [Line ImmunoAssay]; Innogenetics N.V., Ghent, Belgium).

Additionally, in the standard protocol, direct microscopy on Gram stain and wet mounts is performed for gonorrhea, nonspecific urethritis, and trichomoniasis. In case of ulcerative diseases, dark-field microscopy is performed for detection of *T. pallidum*, and Tzanck smears are taken for the detection of *Herpes genitalis* 1 and 2. Patients in the standard screening protocol may receive

immediate treatment based on the preliminary results of direct microscopy available within 30 minutes.

Statistics

To evaluate the effectiveness of the prioritizing system, we included all new consultations (i.e., evaluation of a possible new episode of STI) from June 2004 to June 2005. Effectiveness was defined as the capacity to discriminate between high- and low-risk visitors, i.e., those with and without an STI. We analyzed differences between visitors in the standard and short screening protocol univariately using the χ^2 test and Student *t* test. Variables available for comparison of the 2 screening protocols were age, gender, ethnic background, and health insurance. Differences in the prevalence of STI diagnoses between the 2 protocols were also analyzed by the χ^2 test. To evaluate the discriminative capacity of the prioritizing system and the individual prioritizing questions, we assessed the sensitivity, specificity, and positive and negative predictive value in differentiating between persons with and without STI. The discriminative capacity of the system was assessed only for those STI diagnoses pertaining to both the standard and short protocol (i.e., syphilis, urogenital chlamydia, urogenital gonorrhea, and HIV). We defined statistical significance as $P < 0.05$.

Results

Study Population

From June 2004 to June 2005, there were 22,447 new consultations. Of these, 8,056 (36%) had no score on any of the prioritizing questions and were therefore assigned to the short protocol. As a result of prioritizing question 5, all MSM were included in the standard protocol.

Heterosexual visitors assigned to the standard protocol were significantly older (median age, 27 years; interquartile range [IQR], 22–34) than those in the short protocol (median age, 25 years; IQR, 23–38, $P < 0.001$) and were less often health-insured (84% vs. 91%, $P < 0.001$) than visitors in the short protocol. In the standard protocol, 64% of the heterosexual visitors were of Dutch background compared with 75% in the short protocol ($P < 0.001$). More visitors of Surinam/Antillean background (13% vs. 10%, $P < 0.001$), Latin American background (4% vs. 2%, $P < 0.001$), and sub-Saharan African background (4% vs. 3%, $P < 0.001$) were assigned to the standard protocol than to the short protocol.

Sexually Transmitted Infection Diagnoses

The STIs for which both groups had testing were diagnosed significantly more often among visitors in the standard protocol than those in the short protocol (16.6% vs. 7.1%, $P < 0.001$; Table 1). Of these STIs, urogenital chlamydia infection was most frequently diagnosed in both protocols (10.3% in standard vs. 6.4% in short protocol). As a result of more extensive testing in the standard protocol, 1,899 additional STI diagnoses (i.e., other than urogenital chlamydia, urogenital gonorrhea, syphilis, and HIV) were made among high-risk visitors (Table 2).

Of the additional STIs revealed by standard screening, the most frequently diagnosed were condylomata acuminata (625 [4.3%]), anogenital chlamydia (359 [2.5%]), and anogenital gonorrhea (326 [2.3%]).

Patients diagnosed with urogenital chlamydia or urogenital gonorrhea in the short protocol received a follow-up physical examination and additional STI testing. Of the 566 patients so diagnosed, 509 (91%) returned for additional screening. Among these, very few additional STI diagnoses were found (Table 2). Subanalyses of visitors in the standard protocol (reporting or denying physical

TABLE 1. STI/HIV Diagnoses in the Standard and Short Screening Protocols in 22,447 New Consultations, STI Outpatient Clinic, Amsterdam Health Service, June 2004 to June 2005

Variable	Standard Protocol (% of nc)	Short Protocol (% of nc)	<i>P</i>
New consultations (nc)*	14,391	8,056	
Total STI/HIV diagnoses	2,610 (18.1)	609 (7.6)	<0.001
Urogenital chlamydia	1,476 (10.3)	514 (6.4)	<0.001
Urogenital gonorrhea	630 (4.4)	52 (0.6)	<0.001
Syphilis†	386 (2.7)	23 (0.3)	<0.001
Total HIV tests	6,635 (46.1)	6,201 (77.0)	<0.001
HIV-positive (percent of total HIV tests)	118 (1.8)	20 (0.3)	<0.001

*i.e., evaluation of a possible new episode of STI.

†Syphilis diagnoses consist of primary, secondary, and latent infections. STI indicates sexually transmitted infection.

complaints) revealed that most clinical diagnoses and STI-related syndromes were diagnosed among visitors reporting physical complaints (data not shown). No pelvic inflammatory disease was diagnosed in the standard group of visitors denying physical complaints ($n = 4,037$).

HIV

In the study period, 12,837 (optional) HIV tests were performed as part of STI screening. In the standard group, 46% opted to have an HIV test compared with 77% in the short screening group ($P < 0.001$). With the introduction of the prioritizing system, the uptake of HIV testing in the heterosexual group as a whole

TABLE 2. Additional STI Diagnoses, Tested Only in the Standard Protocol or in Persons From the Short Protocol Who Were Diagnosed With Urogenital Chlamydia or Gonorrhea and Returned for Additional Testing, STI Outpatient Clinic, Amsterdam Health Service, June 2004 to June 2005

Variable	Standard (% of nc)	Patients Additionally Tested*
New consultations (nc)†	14,391	509
Total additional STI diagnoses	1,899 (35.7)	17*
Anogenital chlamydia	359 (2.5)	2*
Lymphogranuloma venereum	41 (0.3)	
Anogenital gonorrhea	326 (2.3)	5*
Orogenital gonorrhea	99 (0.7)	
HepB carrier (optional test)	17 (0.1)	
Trichomonas vaginalis (women only)	124 (0.9)	5*
Herpes simplex virus I (by ulcers)	111 (0.8)	
Herpes simplex virus II (by ulcers)	197 (1.4)	
Condylomata acuminata	625 (4.3)	5*

*STI diagnoses after additional testing and physical examination of visitors diagnosed with urogenital chlamydia or urogenital gonorrhea in the short screening protocol.

†i.e., evaluation of a possible new episode of STI.

STI indicates sexually transmitted infection.

TABLE 3. The Sensitivity, Specificity, and Positive/Negative Predictive Value of the Prioritizing System in Diagnosing Persons With an STI* in 22,447 New Consultations at the STI Outpatient Clinic of the Amsterdam Health Service, June 2004 to June 2005†

Variable	Sensitivity (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)
Prioritizing system overall	74	42	16	92
1. Do you have STI-related physical complaints?	57	60	18	90
2. Were you notified of STI exposure by a sexual partner?	18	92	26	88
3. Did you have an STI in the past 6 months?	12	92	19	87
4. Did you get paid for sexual contact?	3	97	12	87
5. If male, did you have sex with men?	37	70	18	86
6. If female, did you have anal sex in the past 6 months?	10	87	9	89

*Only the STI tested in both procedures, i.e., urogenital chlamydia, urogenital gonorrhea, syphilis, and HIV.

†Values are given for the total system as well as for individual questions.

STI indicates sexually transmitted infection.

increased from 43.2% in 2003 to 56.4% in 2004, whereas the MSM group remained stable (37.3% in 2003 to 39.4% in 2004). HIV prevalence was 1.8% (n = 118) in the standard group and 0.3% (n = 20) in the other group (Table 1). Most striking characteristics of the 20 patients tested HIV-positive in the short protocol were the absence of health insurance (65% vs. 17% of the 118 HIV-infected patients in the standard protocol) and having a sub-Saharan background (55% vs. 6% of the HIV-infected patients in the standard protocol).

Discriminative Capacity

Table 3 shows the discriminative capacity of the prioritizing system and its individual prioritizing questions. The overall sensitivity of the system is 74% and the specificity is 42%. Because a visitor in the short screening group could be switched to the standard group on revealing additional information, system sensitivity was in practice higher (80%) and specificity was lower (38%). The highest sensitivity was associated with reporting STI-related complaints (57%) and being an MSM (37%). Poor sensitivity was associated with (self-reported) STI in the last 6 months, being paid for sex, and having anal sex (women only). Omitting these 3 questions in the prioritizing system would decrease the overall sensitivity only slightly to 72% while increasing overall specificity to 48%.

Discussion

The prioritization system is feasible, easy to use, and effective in differentiating between high- and low-risk visitors. The prevalence of STI/HIV was significantly lower for visitors in the short screening protocol (low risk) than for those in the standard protocol (high risk). Screening was adjusted according to the risk profile of visitors, being most extensive for those with a higher probability of an STI. Those with lower probability received less time-consuming screening based on self-collected samples. This freed time to increase the overall screening capacity of the STI clinic without expending more resources.

However, evaluating effectiveness of the prioritizing system was possible only for those STI tested for in both protocols (i.e., syphilis, urethral gonorrhea and chlamydia, and HIV). Because STI such as herpes simplex and condylomata acuminata are largely diagnosed in the presence of physical symptoms, we may have underestimated the discriminative capacity of the system as a whole and, in particular, of question 1 pertaining to symptomatic STI.

In other prioritization systems, low-risk visitors are referred—with or without an appointment—for the same type of service at a later time or other place.^{2,3} Our goal was to offer same-day access

to all visitors. We achieved this by differentiating in type of service, thus preserving the low threshold of the clinic and avoiding the risk that persons sent away would be lost for STI screening. This strategy is supported by the high chlamydia prevalence rate (6.4%) found in the short protocol (low-risk population), whereas prevalence in the Dutch general population in highly urbanized areas is considerably lower (3.2%).^{10,11}

Substantially more new consultations were processed in the study period compared with previous years. Although some of the increase (on average 2–4%) reflects a trend already observed for years, the larger increase in 2004 of 9% can probably be attributed in part to implementation of the new prioritizing system.

We think that the substantially higher uptake of HIV testing in the short protocol group compared with the standard protocol group can be related to the phenomenon of “worried well” visitors. Furthermore, we speculate that the absence of HIV pretest counseling in the short protocol might have increased the uptake as well. Presumably, the HIV test became more part of a routine checkup.

This prioritizing system can easily be implemented at other STI clinics. However, local epidemiologic distributions of STI in the Amsterdam population determined the prioritizing questions. At other STI clinics, other risk groups might be present. A prioritizing system should therefore be adapted based on local epidemiologic characteristics of groups at risk for STI. Moreover, it should be evaluated periodically to adjust to changes in the local risk factors for STI.

Our study showed that using MSM as the only risk group for prioritizing is not sufficient, because only 37% of the STI diagnoses were filtered out by our MSM-related question. The questions related to physical complaints, MSM, and notification by partner were most sensitive and will remain included in our prioritizing system. As for additions, we found that having no health insurance and having a sub-Saharan African background characterized the majority of the visitors in the short protocol who were diagnosed with HIV. We have therefore made a simple alteration of the system, so these visitors are now assigned to the standard protocol in which they receive the more extensive pretest HIV counseling.

Questions with low sensitivity can be omitted to improve the simplicity of the prioritizing system without decreasing substantially its discriminative capacity. Thus, the question about previous STI has already been omitted at our clinic. On the other hand, the question referring to anal sex among female visitors is not omitted, despite its low sensitivity, which is partly the result of the low frequency of anal sex among women. Testing for asymptomatic anal gonorrhea and anal chlamydia in this group was considered relevant and those infections would be missed in women if assigned to the short protocol. We are considering the introduction of

a self-collected anal swab procedure to the short protocol, enabling that protocol to screen persons who have anal sex but no other high-risk behavior.

In conclusion, the prioritizing system proved an effective, flexible, and easily adjustable tool to help meet the demands of increasing visitors to STI clinics without increasing clinic resources. It allows for differentiating between higher- and lower-risk visitors for assignment to screening protocols based on risk assessment. As a result of visitor prioritization, we were able to use our resources more effectively, increasing access to STI screening and care at our clinic. Visitors in the short protocol receive no risk reduction counseling, and a few asymptomatic STI such as trichomoniasis, condylomata acuminata, scabies, and pediculosis can be missed. These drawbacks are nevertheless outweighed by the larger population screened for STI and HIV.

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