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Comparative effectiveness of two self-collected sample kit distribution systems for Chlamydia screening on a university campus

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Abstract

Objectives—*Chlamydia trachomatis* (CT) rates and incidence continue to increase, and university students are known to engage in high-risk activities, but studies of CT prevalence in this population are limited by poor screening rates. Utilisation of self-obtained sample (SoS) kits in private student residencies may reduce screening barriers. The authors sought to determine the relative effectiveness, and comparative effectiveness, of two SoS kit distribution mechanisms: one which provided kits directly to students and another encouraging students to order kits from a website.

Methods—During 2010–2011, residents of six university dormitories were provided training sessions describing CT, the project and SoS kit use. Students in three dormitories were provided kits, and the remaining students directed to the website (<http://www.iwantthekit.org>).

Results—Of 391 resident students, 163 were provided with kits and 175 were directed to the website. Of provided kits, 12 (8 women) were returned and 2 (16.7%; both women) were positive. Of only three internet-requested kits, all were returned (all women) and none were positive. In a post-project survey examining non-participation, 26.2% of students were unaware of the project (no difference by dormitory or gender) and 58.5% of women cited prior testing as part of a medical exam.

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Contributors All authors contributed to manuscript preparation and review. In addition, WDJ, RW, PC and CG devised and implemented the project; WDJ provided data analysis and CG provided sample analysis.

Competing interests None.

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Conclusions—Though direct kit distribution was more effective in student screening engagement, overall participation was poor despite widespread advertising. The methodology of online testing and SoS kits has been well validated elsewhere, but research is needed to successfully engage university students in screening and refine SoS target populations in light of changing healthcare policies.

INTRODUCTION

Reported cases of *Chlamydia trachomatis* (CT) in the USA exceeded 1 000 000 for the first time in 2006,¹ with this milestone somewhat coinciding with the report that 26% of adolescent women were infected with at least one sexually transmitted disease (STD).² With the majority of CT cases remaining asymptomatic, and untreated and multiple infections progressing to pelvic inflammatory disease and further morbidity, chlamydia remains a serious threat to women's health. The annual national cost associated with CT and *Neisseria gonorrhoeae* (GC) infection is in excess of \$2.5 billion.³ Current estimations place the progression of untreated chlamydia to pelvic inflammatory disease (PID) at 420.3/100 000 person-years (those aged 15–19 years), with a cost of treating PID of \$1995 and direct medical costs of CT at \$315.⁴⁵

University campuses might be expected to be significant sources of infection and transmission due to reported rates of risky sexual behaviour.⁶ Student surveys have found that 14.0% of respondents reported risky sexual behaviour, 49.1% of students had had vaginal intercourse during the past 30 days and only 52.8% reported having always used a condom during this period.⁷ Though seldom examined as a group, commuter students engage in similar risk activities such as low condom use.⁸ However, actual prevalence estimates do not consistently confirm the hypothesis that greater rates of high-risk behaviour translate into increased incidence of CT, and studies of CT in US colleges report prevalences ranging from 3.4% to 9.7%.⁶⁹

In spite of the potential for intervention in these settings, only 36% of all 2- and 4-year colleges and universities admitting 500+ students are capable of testing for both CT and GC, only 24% actually screen women, and smaller universities might be expected to have fewer, rather than greater, screening resources.¹⁰ University students are often in a situation where on campus screening is not available and they are distant from their primary care provider.

A screening methodology that removes many barriers to screening consists of self-obtained samples (vaginal/urethral swabs and urine) available through the website <http://www.iwantthekit.org>.¹¹ Individuals can access information on STDs, ascertain if they are at risk of having or enquiring an infection and request that a self-obtained sampling (SoS) kit be mailed to their home. The kit is mailed to the individual and the sample taken at their discretion. The sample and forms are returned for analysis, and the results are available within 1–2 weeks. All these activities are free to the individual. The kits and use of swabs have been extensively tested and found acceptable to women,¹² to men¹³ and are adequately sensitive compared with traditional sample types such as urine.^{13–15} Furthermore, studies also show that the use of SoS (vs collection by clinicians) is more cost-effective.¹⁴

This study sought to determine the relative effectiveness, and comparable effectiveness, of two models of SoS kit distribution: mass distribution versus website request promotion. Students may be more inclined to participate if they already have a kit in their possession (mass distribution), but there is the risk of waste for unwanted/unused kits. Alternatively, website requests may reduce such waste but inhibit participation by the need to take action and request a kit. The objective of this study was to compare the relative effectiveness of these two methods and determine which is more effective in identifying infected individuals.

MATERIALS AND METHODS

The project was based on the campus of a small, liberal arts university in Illinois with an on-campus population of approximately 482 students residing in six dormitories and approximately 114 commuter students. All current students aged 18 years and older were eligible to participate. The project was introduced to students during dormitory and commuter lounge meetings at the beginning of the academic year (August 2010). At these meetings, students were provided a talk on STDs, had the project and its aims described and received a demonstration of the SoS kit use. Students in three of the dormitories (KITDORM; 1 female only, 1 male only and 1 co-ed) were then each given a kit to take with them. Students in the other three dormitories (WEBDORM; all co-ed) were directed to the website (<http://www.iwantthekit.org>) and told how to request a free kit be sent to them through the mail. Commuter students (COMMUTER; one co-ed meeting) were also provided kits. Additional kits were available through WEBDORM residency directors and the Student Life Office. All samples were sent by student participants directly to the Johns Hopkins University laboratory for analysis for CT and GC. Results were sent to the Illinois Department of Public Health (IDPH) within 2 weeks of analysis. Students accessed their results by calling the IDPH. Treatment and follow-up for those testing positive was coordinated by the local health department.

Advertising of the project was done through the posting of fliers and posters in all academic areas and residence halls before school began on 30 August, with replenishment/reposting on 18 January. Furthermore, emails promoting the project were sent to all students on 30 August, 8 October, 1 December, 15 February and 20 April. Finally, project information tables with kits were available during the campus activity fair (24 August), World AIDS Day (1 December) and on 15 February. An academic yearend survey of students was conducted in May 2011 at a school-wide social function to ascertain the level of student knowledge of and engagement with the project. The study ended with the academic year in May 2011.

Analysis

Variables for analysis included student distribution by gender and dormitory, student participation rates and test results and student survey responses on the topics of sexual history, project knowledge and screening participation. Student demographics were obtained from the university Student Life office participants and test results were obtained from the IDPH STD Section and survey responses drawn from completed and submitted yearend surveys. Pearson χ^2 tests were utilised to examine differences in screening engagement by dormitory and gender. Such analyses were also conducted on the year-end survey, examining differences in project knowledge and participation, sexual activity and screening by dormitory and gender. Furthermore, logistic regression was performed to examine any association between number of sexual partners and project participation. All calculations were performed using SPSS V.19 (IBM).

Institutional Review Board review and approval was granted by the Springfield Committee for Research Involving Human Subjects (IRB for the SIU School of Medicine; approval #10-052).

RESULTS

A flowchart of student assignment and participation by study arm is provided in figure 1. Of 229 KITDORM residents, 163 (71% of all) attended the meetings and 117 women (79% of women) and 46 men (58% of men) received a kit (table 1). Of 114 COMMUTER students, 12 (11%) attended the meeting and five women (9%) and seven men (11%) received a kit.

Of 253 WEBDORM residents, 175 (69%) attended the meetings and 95 women (77%) and 80 men (62%) were directed to the website. An additional 23 kits (19 women and four men) were distributed by the Student Life Office. Of 198 total distributed kits, 12 (6.1% of all kits; eight women) samples were returned and 2 (16.7%; both women) were positive for CT. Only three kits (all women) were requested from the website, samples were returned from all three and none were positive. There were no gonorrhoea positives. Participation rates were significantly different between the two groups ($p=0.033$), with those having been provided kits more likely to participate. Sample submissions were generally grouped around project advertising. Ten of the 15, including the three internet-requested kits, were collected and analysed corresponding to project initiation (between 25 August and 28 September 2010) and another three with an outreach associated with students' return from the winter break (between mid-January and 28 February 2011).

Of 62 completed end-of-year surveys, 30 (48.4%) were from KITDORM, 27 (43.5%) from WEBDORM and 5 (8.1%) from COMMUTER. Overall respondents were 66.1% women, 72.6% sexually active in the past year, 12.9% (8 students) had participated in the project and 26.2% were unaware of the project (no difference by dormitory or gender; $p>0.05$). There was no association between number of sex partners in the past year and participation (logistic regression; $p=0.494$). Under *reasons for non-participation*, 58.5% of women reported having already been tested as part of a medical exam, 56.1% reported use of prescription birth control and 56.1% reported human papillomavirus vaccination.

From KITDORM respondents, 10.0% said they had not heard of the outreach, 33.3% did not know they resided in a KITDORM, 73.3% said they were sexually active in the past year, 36.7% said they had two or more partners in the past year and 20.0% said they did not participate because they did not know about the outreach (no significant gender differences). However, men were more likely than women to say they participated (44.4% vs 9.5%; $p=0.028$). From WEBDORM respondents, 15.4% said they had not heard of the outreach, 34.6% did not know they resided in a WEBDORM, 3.8% said they participated, 88.5% said they were sexually active in the past year, 42.3% said they had two or more partners in the past year and 34.6% said they did not participate because they did not know about the outreach (no significant gender differences). None of these variables significantly differed between KITDORM and WEBDORM respondents. COMMUTER responses were not separately analysed due to low response (five surveys).

DISCUSSION

Ultimately, participation by students was quite poor at under 3%. While the positivity rate for distributed kits was 17%, the utility of this result is mitigated by the waste of the 94% of kits not used. The website was also under-utilised, with only three kits requested and no positive results. We cannot therefore state that either method was effective in engaging students. While the participation rate was significantly different, with those given kits more likely to be screened than those directed to the website, again the total participation is too low for this to meaningfully guide the implementation of either method. The year-end survey showed that the majority of students were sexually active, with more than one-third having two or more partners in the past year but more than one-quarter reported being unaware of the project in spite of widespread advertising throughout the year. Furthermore, more than half of female respondents reported having already been tested as part of a medical exam as a reason for non-participation. The failure of this project to successfully engage students in screening raises some important issues for consideration.

One question bearing examination is whether university screening programmes, especially those considered novel or less cost-effective, are warranted. In the USA, annual chlamydia

screening for sexually active women is covered by most private insurances and Medicaid. However, this is only performed 41.6% of the time.¹⁶ Furthermore, it is estimated that 27.2% of individuals aged 18–24 years (>8 million) lack health insurance.¹⁷ This may be substantially mitigated by the recently passed Patient Protection and Affordable Care Act whereby young adults may be kept on their parents insurance until aged 26 years and where student-purchased health insurance policies are now expanded and protected.¹⁸ However, there are still likely substantial proportions of the university population who will not undergo routine screening due to guideline compliance failure on the part of providers, lack of coverage allowing routine screening or other barriers such as lack of opportunity and motivation. The utility of internet-based screening may thus depend upon careful targeting to specific populations, as has been observed in multiple venues.^{19,20} For example, in one study, the majority (75.7%) of women preferred the convenience of self-collecting a sample in their home versus visiting a clinic (16.1%) or their own medical provider (8.2%).²¹ The option for home collection was associated with significantly increased rates of overall screening and rescreening of those testing positive.^{22,23}

Another consideration is why participation was so low and how that may be addressed. It is unlikely that low participation is unique to this institution, as similarly low participation in response to a widely advertised screening outreach has also been reported elsewhere.²⁴ Furthermore, STIs in general are not a major concern among adolescent and young women, most of whom report being healthy and feeling well.²⁵ Also potentially reducing motivation is college students' general belief that they engage in less HIV-risk behaviours than the 'average' student, increasing the perception that the messages do not apply to them.²⁶ This may factor into the post-project survey results where more than 3/4 of respondents stated they were sexually active within the last year and more than 1/3 stated they had two or more partners, but there was no association between number of sexual partners and project participation. Our study highlights how simply reducing/removing screening barriers (eg, time, travel, cost) may be insufficient to expand screening and that individuals in the target population must be suitably engaged and motivated to participate.

As for comparing the two different mechanisms, while the data suggest that a significantly greater proportion of students participate in screening when provided with SoS kits versus being directed to a website to request the same, only 6% of women and 7% of men provided kits participated. A similar study in Sweden mailed sample kits to 1074 eligible men and had a 37% return rate.²⁷ However, in this case, test kits were mailed to individuals' homes from a government agency, and cultural and situational differences are likely significant contributors to the differing response rates. The costs of wasted (non-returned) kits may well be the key feasibility factor. Of the 198 kits distributed, only 12 were returned for analysis with a resultant cost of ~\$1674 for wasted kits. More research should be performed to better determine the cost-effectiveness of this mechanism in terms of expenses versus averted morbidity as well as more accurately targeting distribution to those at greater risk (eg, only sexually active individuals and those not receiving screening elsewhere).

Response from those directed to the website was even lower with 3% of women and zero men requesting kits. This is similar to another study in Sweden where all inhabitants of a county were eligible to request a kit online.²⁷ Here, only 0.4% of residents participated. While the factors associated with a website's success in attracting its intended target audience are complex, advertising is of known importance. In fact, the association between advertising and online kit requests has been shown for both <http://www.iwantthekit.org> and a syphilis testing programme in the Netherlands.^{28,29} For this project, sample submission dates and survey data show that kit use was closely linked to project advertisement and student knowledge. Sixty-six per cent of all submitted samples were done so within 1 month of project commencement and another 20% within 6 weeks of the beginning of the spring

semester. The survey also showed that one-quarter of students were unaware of the project, in spite of dormitory meetings and other on-campus outreaches. The challenges associated with advertising an online website are not unique to STIs, and the skills, technology and resources required to do so successfully are not traditional components of STI programmes. Such programmes desiring to establish internet-based testing, or other STI interventions, may therefore need to develop such capability in-house or obtain it through collaborations.³⁰

Limitations

There are limitations to this study. Individual participation was only 2.5% (15 kits returned from a total campus and commuter population of 596) and so general campus prevalence cannot be accurately determined. We cannot therefore explain the relatively high positivity rate for female distributed kit samples. There is also the potential for distributed kits having been given to and used by students in website-directed dormitories. Eight students (12.9%) from the survey reported having given their kit to someone else, but it is not known to whom it was given or if it was then used. In addition, the Student Life Office distributed 23 kits but did not track to whom they were given. While they were directed to be given to KITDORM or COMMUTER students, some may have been given to WEBDORM students, and this may change the distinctions between KITDORM versus WEBDORM student characteristics.

This study highlighted the limited utility of online testing when targeted to a general, though potentially high risk, college population. Online testing via <http://www.iwantthekit.org> has been shown to be highly acceptable by both women and men, with participants finding the materials and internet site easy to use, and analysis of self-obtained swabs has been validated and is comparable to clinician-obtained samples. The aspects requiring further research may lie more in the direction of which populations are targeted for this resource, how is it adequately advertised and how are target participants successfully engaged to participate? In the USA, for example, future expansion of healthcare coverage may significantly reduce the number of those lacking other screening options. Insurance coverage still does not necessarily equate to actual screening as less than half of those covered are screened according to guidelines. Physician education and motivation to do so also required further study. Furthermore, home-based sample collection may remain useful to augment rescreening rates. Other countries lacking extensive healthcare infrastructure and healthcare coverage, or where such preventive screening is not routine, may also benefit from this as its cost-effectiveness is dependent upon scale of use. Ultimately, online testing resources are likely to be best utilised, and most effective, when incorporated as a tool in larger intervention strategies.

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Key messages

- ▶ University students, with documented increased rates of risky sexual behaviour, might be expected to have concomitantly high rates of STIs, but this is inconsistently observed.
- ▶ Almost all university screening programmes require students to attend a clinic/facility for specimen collection, which may or may not be a significant barrier to widespread participation.
- ▶ Utilisation of an online screening programme, whereby kits were either directly provided to some students or where other students requested kits online, failed to engage a significant proportion of the campus community in spite of widespread advertising.
- ▶ Though this online testing method has been shown effective and acceptable to participants in other venues, successfully engaging university populations in its use will require further investigation.
- ▶ The utility of online testing may be maximised when incorporated as a component of larger intervention programmes and utilised for specific populations and purposes.

Figure 1.
Flowchart showing student distribution and participation by study arm.

Table 1

Student engagement by study arm, University SoS Study, 2010–2011

Study arm	Residence	No. of residents			Attending meeting, n (%)			No. of kits returned			CT positives, n (%)		
		W	M	Total	W	M	Total	W	M	Total	W	M	Total
Distributed kits	KITDORM 1	58	36	94	47 (81)	22 (61)	69 (73)	8	4	12	2 (25)	0	2 (16.7)
	KITDORM 2	0	44	44	0	26 (59)	26 (59)	0	0	0	0	0	0
	KITDORM 3	91	0	91	70 (77)	0	70 (77)	0	0	0	0	0	0
	KITDORM totals	149	80	229	117 (79)	46 (58)	163 (71)	8	4	12	2 (25)	0	2 (16.7)
Website directed	Commuters	53	61	114	5 (9)	7 (11)	12 (10)	0	0	0	0	0	0
	WEBDORM 1	21	33	54	20 (95)	15 (45)	35 (64)	3	0	3	0	NA	0
	WEBDORM 2	43	68	111	40 (93)	40 (59)	80 (71)	0	0	0	0	0	0
	WEBDORM 3	59	29	88	35 (59)	25 (86)	60 (68)	0	0	0	0	0	0
	WEBDORM totals	123	130	253	95 (77)	80 (62)	175 (69)	3	0	3	0	0	0

CT, *Chlamydia trachomatis*; M, men; NA, not applicable; SoS, self-obtained sample; W, women.