ADOLESCENT SEXUAL HEALTH

Provider willingness to screen all sexually active adolescents for chlamydia

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Sex Transm Infect 2002;**78**:369–373

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Accepted for publication 26 July 2002

Objectives: To assess differences in provider willingness to screen all sexually active male and female adolescents for chlamydia and to determine whether concerns about cost effectiveness of screening are related to provider willingness to screen for chlamydia.

Methods: All primary care providers in a managed care organisation self administered a survey about screening all sexually active adolescents for chlamydia.

Results: Respondents were 217 physicians (MDs) and 121 nurse practitioners (NPs) or physician assistants (PAs). Excluding obstetrician/gynaecologists, more providers were willing to routinely screen adolescent females than males for chlamydia (67% *v* 49% respectively; p<0.001). Independent predictors of provider willingness to screen both males and females included belief that routine screening is cost effective and being a NP/PA *v* an MD. Belief that chlamydia screening is easier in females than males independently predicted less willingness to screen males.

Conclusion: Information that reduces provider concern about the cost effectiveness of screening may increase provider willingness to screen adolescents for chlamydia. Availability of urine based tests may reduce provider beliefs that females are easier to screen than males and increase chlamydia screening in males.

The most commonly reported notifiable disease in the United States is *Chlamydia trachomatis* and reported rates of chlamydial infection continue to increase.[1] While the overall reported rate of chlamydial infection is four times higher among females (404.0 cases per 100 000 females) than males (102.8 cases per 100 000 men), reported rates from 1996 to 2000 increased more for males (71.9%) than females (26.4%).[1] Increases in reported chlamydia infection rates are believed to reflect an increase in chlamydia screening, use of more sensitive diagnostic tests, increased emphasis on case reporting from providers and laboratories, and improvements in information systems for reporting.[1]

Primary care and sexually transmitted disease (STD) prevention guidelines recommend annual assessment of adolescent sexual activity and chlamydia screening of all sexually active adolescent females.[2–6] Screening sexually active female adolescents every 6 months has also been recommended.[7–9] The most widely used system for assessing managed care organisation (MCO) performance, the Health Plan Employer Data and Information Set (HEDIS), has established annual screening for chlamydia in sexually active females age 15–25 years as a measure of quality of care.[10] Although screening sexually active young males may be recommended where asymptomatic infection is highly prevalent, the US Preventive Services Task Force determined that there was insufficient evidence to recommend for or against routine screening of high risk males.[2] Screening for chlamydia infection often occurs less frequently than currently recommended.[11–13] Given the lack of clear guidelines for screening adolescent males, lower rates of screening adolescent males than females could be expected. Nevertheless, as chlamydia has been commonly identified in both male and female sexually active adolescents in various community settings and asymptomatic male infection may be an unidentified risk for female infection, examination of provider willingness to routinely screen both male and female adolescents is warranted.[14–16]

Low rates of chlamydia screening may result from a number of barriers to routinely screening sexually active adolescents for STDs. These barriers may be provider specific or related to healthcare delivery systems. Much attention has been given to reports that providers perceive discomfort and lack of confidence in addressing sexual behaviour with their adolescent patients.[12 13 17–20] One recent survey on barriers to screening sexually active adolescent females for chlamydia found that certain provider characteristics were associated with conducting increased routine chlamydia screening (female provider, clinic practice, metropolitan practice location, >20% African-American patients) and that screening was related to provider feelings of responsibility and knowledge related to chlamydia and its outcomes.[13]

Little attention has been given to another possible barrier, provider concern that the benefit of routine screening does not warrant its cost. Given the current emphasis on cost effective care and interest in the cost effectiveness of chlamydia screening,[10 21–24] it is possible that providers' screening practices are influenced by concerns about cost. Concerns about costs may be expressed in general communications from MCO administrators to providers and may have variable effects on providers' willingness to screen all adolescent patients for chlamydia.

It is also possible that provider concerns about cost effectiveness regarding chlamydia screening may differently affect the willingness of providers to screen male compared with female adolescents.[25] Barriers to screening for chlamydia among adolescent males have received less attention than barriers to screening adolescent females. The purpose of this study was to: (1) determine whether providers are more willing to routinely screen sexually active females than males for chlamydia, and (2) examine whether concern over cost effectiveness is a significant independent predictor of providers' willingness to conduct routine chlamydia screening of sexually active adolescents. These analyses may provide insight into the basis of variations in chlamydia screening rates between male and female adolescents, and point to ways for improving rates of chlamydia screening among sexually active adolescents.

Table 1 Respondent *v* non-respondent characteristics

Characteristics	Respondents No (%)	Non-respondents No (%)	p Value
Sex:			NS
Male	119 (35.2)	136 (37.8)	
Female	219 (64.8)	224 (62.2)	
Provider type:			0.004
Physician	217 (64.2)	267 (74.2)	
Nurse practitioner/physician assistant	121 (35.8)	92 (25.6)	
Primary specialty:			0.001
Paediatrics	89 (26.3)	76 (21.1)	
Family practice	30 (8.9)	51 (14.2)	
Internal medicine	144 (42.6)	195 (54.2)	
Obstetrics/gynaecology	75 (22.2)	38 (10.6)	
Primary practice location			NS
Urban	41 (12.1)	33 (9.2)	
Suburban	297 (87.9)	327 (90.8)	
Graduation from medical training			NS
1950–69	16 (8.6)	14 (5.7)	
1970–9	40 (21.6)	39 (15.8)	
1980–9	73 (39.5)	117 (47.4)	
1990–9	56 (30.1)	77 (31.2)	
Number of adolescent patients per month			0.001
None	9 (2.7)	47 (13.1)	
1 to 50	269 (79.6)	286 (79.4)	
51 to 100	55 (16.3)	25 (6.9)	
>100	5 (1.5)	2 (0.6)	

METHODS

A questionnaire was drafted and revised based on a review of previous surveys and input from the team of investigators representing behavioural science, infectious disease, and adolescent medicine specialists. The purpose of the questionnaire was to assess provider attitudes regarding chlamydia screening among managed care organisation (MCO) members age 12–19 years. Administration of the survey received MCO and university institutional review board approvals. Targeted providers for the survey were all primary care physicians, nurse practitioners (NPs), and physician assistants (PAs) in paediatrics, family practice, obstetrics/gynaecology (Ob/Gyn), and internal medicine in a large non-profit, group model MCO in the Mid-Atlantic region of the United States. All of these providers were expected to see adolescents for primary care at the MCO with obstetrics/gynaecology also being a referral site when pelvic examinations were required. Providers were salaried employees of the medical group for the MCO. Non-amplified DNA probes (GenProbe, San Diego, CA, USA) were used for chlamydia screening within the MCO system. In October 1999, the questionnaire was mailed to all 698 active eligible primary care providers identified in the MCO's administrative databases. The questionnaire was mailed with a cover letter, signed by the executive director of research for the MCO, that specified the confidentiality of the questionnaire. The questionnaire was designed to take approximately 10 minutes to complete and no special incentive was offered to survey participants. A reminder letter and second copy of the questionnaire was mailed to non-responders 1 month after the initial mailing. Characteristics including provider sex, practice type, practice specialty, primary practice location, year of medical school graduation, and average number of adolescent patients seen per month over the last year were obtained from the MCO administrative databases and compared between responders and non-responders (table 1).

In the questionnaire, respondents reported their sex, practitioner type, specialty, practice location, year of final medical training, and average number of adolescents seen per month. Regarding other questions included in modelling of provider willingness to screen, respondents indicated their level of agreement (agree = 1, neither agree nor disagree = 2, or disagree = 3 recoded as 1 *v* 2 or 3 for multivariate analysis) with the following statements: "Screening all sexually active adolescents for chlamydia is not cost effective care in my practice," "I am willing to screen all sexually active adolescent females for chlamydia," "I am willing to screen all sexually active adolescent males for chlamydia," "I am well trained to address sexual risks with young adolescent patients," "It is easier to conduct chlamydia screenings on adolescent females than adolescent males," and "I am confident in my ability to identify adolescents who need chlamydia screening."

At the time of this survey, the MCO was not using urine based tests for chlamydia screening and, therefore, questions about this type of test were not included in analytic modelling of provider willingness. Nevertheless, the following questions were included in the survey to explore the possible impact of urine based screening on providers' chlamydia screening practices. These questions asked whether providers agreed that cell culture is more sensitive than a polymerase chain reaction (PCR) and ligase chain reaction (LCR) urine based screening test for chlamydia (agree, neither agree nor disagree, disagree); thought that their MCO employer supported the use of urine based nucleic acid amplification tests (NAATs) (yes, no, not sure); and thought they would screen more adolescent males and/or females if the MCO supported the use of urine based NAATs.

All data analysis was performed using SPSS for windows version 10.0.[26] Because Ob/Gyns are unlikely to provide care for male patients, they were excluded from all analyses of provider willingness to screen males. Difference between characteristics of responders and non-responders, and between willingness to screen adolescent females and willingness to screen adolescent males, was assessed by Pearson χ^2 test. The two dependent variables were analysed for associations with the categorical and ordinal independent variables using Pearson χ^2 statistics. Willingness to screen for chlamydia was recoded as a dichotomous variable for logistic regression analysis. Because some of the independent variables were highly associated, such as being a NP/PA and being female, a backward stepwise logistic regression analysis was used to determine the independent predictors of each of the two dependent variables. Results of all statistical analyses were considered statistically significant at $p \leq 0.05$.

Table 2 Provider characteristics associated with willingness to screen all sexually active adolescents for chlamydia

Provider characteristics	Screen all males*					Screen all females				
	No	% Willing	% neither willing nor unwilling	% Not willing	p Value	No	% Willing	% neither willing nor unwilling	% Not willing	p Value
Sex					0.03					0.05
Male	81	39.5	22.2	38.3		109	66.1	11.9	22.0	
Female	161	53.4	24.2	22.4		205	74.6	13.7	11.7	
Provider type					0.01					0.07
Physician	153	41.2	26.1	32.7		199	67.8	13.6	18.6	
Nurse practitioner/physician assistant	89	61.8	19.1	19.1		116	78.4	12.1	9.5	
Provider specialty					0.01					0.002
Paediatrics	87	63.2	21.8	14.9		86	70.9	14.0	15.1	
Family practice	45	42.2	26.7	31.1		45	64.4	24.4	11.1	
Internal medicine	110	40.0	23.6	36.4		111	64.9	11.7	23.4	
Obstetrics/gynaecology						73	87.7	6.8	5.5	
Feel well trained to address sexual risks with young adolescents					0.03					0.01
Agree	168	54.8	21.4	23.8		237	76.8	11.8	11.4	
Neither agree nor disagree	56	35.7	25.0	39.3		57	59.6	14.0	26.3	
Disagree	16	31.3	43.8	25.0		19	47.4	26.3	26.3	
Easier to screen females than males					0.01					0.01
Agree	88	33.0	29.5	37.5		122	77.0	14.8	8.2	
Neither agree nor disagree	46	58.7	21.7	19.6		76	77.6	9.2	13.2	
Disagree	107	57.0	19.6	23.4		112	62.5	13.4	24.1	
Screening not cost effective					0.001					0.001
Agree	77	29.9	24.7	45.5		85	40.0	20.0	40.0	
Neither agree nor disagree	45	48.9	33.3	17.8		53	64.2	26.4	9.4	
Disagree	119	60.5	19.3	20.2		176	89.2	5.7	5.1	

*Ob/Gyns were excluded from these analyses.

RESULTS

In all, 338 providers, 217 physicians and 121 nurse practitioners (NPs) or physician assistants (PAs), returned the questionnaire, resulting in a response rate of 48.4%. Relative to non-responders, responders were more likely to be NPs/PAs, Ob/Gyns, and see more adolescent members (table 1).

Simple descriptive statistics indicated that 56% of physicians and NPs/PAs combined believed that screening all sexually active adolescents was cost effective in their practice. Thirty nine per cent of physicians and NPs/PAs combined believed that it was easier to screen for chlamydia among adolescent females than adolescent males. More NPs/PAs (88%) than physicians (69%) thought they were well trained to address sexual risks with young adolescent patients ($p<0.0001$). More NPs/PAs (72%) than physicians (43%) were confident in their ability to identify adolescents who need chlamydia screening ($p<0.0001$). Finally, 72% of physicians and NP/PAs combined said they were willing to screen all sexually active adolescent females for chlamydia. However, more NPs/PAs (55%) than physicians (37%) said they were willing to screen all sexually active adolescent males for chlamydia ($p<0.01$).

Providers were less willing to screen all sexually active males for chlamydia than to screen all sexually active females for chlamydia ($p<0.001$). Overall, 67% of providers, excluding Ob/Gyns, agreed that they were willing to screen all adolescent females for chlamydia compared to only 49% that were willing to screen all male adolescents.

In the bivariate analysis, five variables were associated with willingness to screen both male and female adolescents (table 2). Male providers were less willing than female providers to screen both male and female adolescents. Provider specialty was associated with willingness to screen. Internal medicine specialists tended to be the least willing to screen both males and females. Providers who felt it was easier to screen females than males were less willing to screen males and more willing to screen females. Providers who felt well trained to address sexual risks and who believed that screening was cost effective expressed more willingness to screen both male and female adolescents. Willingness to screen all sexually active adolescents was not associated with recency of specialty training, provider's confidence in ability to identify adolescents needing screening, setting (urban, rural), or the number of adolescents seen each month.

In multivariate analysis, being a NP/PA, seeing fewer adolescent patients, believing that screening is cost effective, disagreeing that it is easier to screen females than males for chlamydia, having more recently completed medical training, and feeling well trained to address adolescents' sexual risks were all independently associated with willingness to screen

Table 3 Characteristics of providers that were independently associated with willingness to screen all adolescents for chlamydia

Characteristic	Screen all males		Screen all females	
	OR (95% CI)	p Value	OR (95% CI)	p Value
Last year of training	0.96 (0.93 to 1.00)	0.04	–	–
Nurse practitioner/physician assistant	1.54 (1.13 to 2.09)	0.006	1.43 (1.03 to 1.99)	0.03
Number of adolescents seen	–	–	0.99 (0.99 to 0.99)	0.01
Believe screening not cost effective	0.32 (0.17 to 0.61)	0.000	0.12 (0.07 to 0.22)	0.000
Feel well trained to address sexual risk with young adolescents	1.94 (1.00 to 3.74)	0.05	2.34 (1.21 to 4.52)	0.01
Believe it is easier to conduct chlamydia screening on females than males	0.36 (0.20 to 0.66)	0.001	1.74 (0.94 to 3.21)	0.08

OR = odds ratio; CI = confidence interval.

all sexually active males (table 3). Ob/Gyns were excluded from this analysis because they do not provide care for male patients.

Also, in multivariate analysis, being a NP/PA, seeing fewer adolescents, believing screening is cost effective, and feeling well trained to address sexual risk were associated with increased willingness to screen females (table 3).

In response to questions about urine based screening, 93% of respondents did not believe that the MCO supported use of the new urine based chlamydia NAATs. Only 43% disagreed that cell culture is more sensitive than a urine based PCR or LCR chlamydia test. Nevertheless, 55% of respondents said they would be prompted to screen more males for chlamydia with the availability of the urine based NAATs, whereas 38% said they were "not sure" and 6% said "no." This last set of responses should be noted with caution, however, as 28% of the survey sample did not answer this question. With regard to whether they would be prompted to screen more females for chlamydia with the availability of the urine based NAATs, 45% said "yes," 41% said "not sure," and 13% said "no."

DISCUSSION

This survey of primary care providers in a large MCO in the mid-Atlantic region of the United States suggested that many providers were unwilling to screen all sexually active adolescents for chlamydia. Furthermore, willingness was generally lower for screening males than females. These findings were supported by an electronic medical record review of this MCO's adolescent members. The study found that while 16% of adolescent females were tested for chlamydia, only 1.5% of adolescent males were chlamydia tested over a 2 year period.[27] Since half of US adolescents are sexually experienced,[28] these rates suggested many sexually active adolescents were not being screened for chlamydia. Furthermore, these rates confirmed the wide gap between screening of females and males. Given clear professional guidelines for screening young sexually active females for chlamydia,[2–6] the observation that only about 70% of providers were willing to follow the screening recommendations suggests there were barriers to screening. The observation that only about 50% of providers were willing to routinely screen all sexually active males for chlamydia was understandable given the absence of clear guidelines for routinely screening young males. Nevertheless, given that the Mid-Atlantic region of the United States, particularly its urban centres, had among the highest rates of chlamydia in the nation,[1] and that infected males may transmit chlamydia to uninfected sexual partners, provider resistance to routine chlamydia screening among sexually active young males may have been due to barriers to screening rather than lack of actual need for screening.

Concern about the cost effectiveness of such routine screening was an independent predictor of screening both male and female adolescents. Provider feelings about the difficulty of conducting screening among males relative to females also surfaced as an additional barrier that limited willingness to screen males. These findings, coupled with the finding that feeling well trained to address adolescent sexuality enhanced provider willingness to screen, suggest that provider education could increase screening. In particular, provider education about taking a sexual history, addressing adolescent sexuality, and the cost effectiveness of routine chlamydia screening among adolescents could increase willingness to screen. Furthermore, new non-invasive, urine based screening tests may decrease provider difficulty screening males and increase their willingness to screen all sexually active adolescent males.

Provider belief that routine screening was cost effective was the strongest predictor of willingness to routinely screen all sexually active adolescents for genital chlamydial infection. Given that much attention has been given to the cost effectiveness of chlamydia screening programmes, it is possible that some providers' lack of willingness to screen reflected cost concerns. Screening for chlamydia is generally viewed as cost effective in populations with prevalence rates as low as 2% to 7%.[10 21–23] At minimum, providers concerned with the cost effectiveness of chlamydia screening should be made aware of the prevalence rates in their patient population, as well as costs of sequelae of missed infections, information which may not be available in many practice settings. The results of this study suggest that an increase in routine screening of adolescents for chlamydia may be facilitated with provider education about cost concerns or the advent of screening methods that have clear and widely known cost benefits.

Belief that screening females is easier than screening males also predicted provider willingness to screen male adolescents for chlamydia. Providers who believed that screening females is easier may have personal discomfort with screening males, be concerned that males experience more discomfort, experience extra burden when screening males in their clinical settings, be unaware of the frequency of asymptomatic male chlamydia infection, or fail to realise the potential prevention and public health impact of screening and treating sexually active adolescent males.[25] These patient-sex related concerns may partially explain why females have been screened for chlamydia at higher rates than males. It is also likely that the routine examination and screening for reproductive tract disease in females (Papanicolau smears) has become culturally ingrained in providers and patients, and the lack of a comparable precedent for routine screening of males remains a barrier to their screening.[29 30]

As with similar provider surveys,[12 13 31 32] the response rate for this survey was low and analysis of responders versus non-responders suggested the responders disproportionately included providers who see more adolescents in their practice. This bias suggests that these findings reflect the responses of those providers in the MCO for whom adolescent chlamydia screening guidelines are most salient. The providers in this non-profit MCO may not be representative of providers in other health plans or in private practice. Future studies may examine whether provider attitudes about chlamydia screening differ by practice setting. Another possible limitation of this study was that the question about the cost effectiveness of routine chlamydia screening was not asked separately for adolescent female and male patients. It is likely that the observed association between perceived cost effectiveness and willingness to screen would have been even stronger if more sex specific cost effectiveness questions had been asked, as providers may view cost effectiveness differently for female and male adolescents.

New urine based NAATs can decrease the use of provider time and equipment, and may decrease provider concerns about the costs of routine chlamydia screening.[23 33–35] Urine based tests may also reduce provider concern over patient discomfort, leading to greater willingness of providers to routinely screen sexually active males. Urine based screening has already shown to be acceptable for routine case finding among females,[36] and cost effective among females when prevalence reaches 2%.[21 22 37 38]

In summary, primary care providers in a non-profit, group model MCO were less willing to screen all sexually active adolescent patients for chlamydia if they questioned the cost effectiveness of this approach. Furthermore, the providers were less willing to routinely screen for chlamydia in sexually active male patients than female patients. A major predictor of sex specific willingness to screen for chlamydia was provider belief that it was easier to screen females than males. Providers with this belief were less likely to screen males. New urine based chlamydia tests have the potential to overcome barriers to screening males for chlamydia. More research is needed to determine whether these screening tests are cost effective for use on a routine basis with both sexually active male and

female adolescent patients in private sector primary care. Informing providers about the chlamydia prevalence and cost effectiveness of routine chlamydia screening in their patient population, and increasing provider access to new, non-invasive screening tests may increase provider willingness to screen all sexually active adolescents for chlamydia.

CONTRIBUTORS

BOB oversaw development of the survey, manuscript research questions, analysis plan, and drafted the manuscript; MHS helped to initiate the project, develop the survey, administer the survey, create the database, and revise drafts of the manuscript; MB conducted statistical analyses, conducted a literature review, and helped to draft and revise the manuscript; GRB helped to initiate the project, develop the survey, and draft and revise the manuscript; DC helped to administer the survey, analyse participants *v* non-participants, create the database, and revise the manuscript; TCQ helped to revise the manuscript; JMZ helped to initiate the project, draft the survey, and revise the manuscript.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the participation of providers at Kaiser Permanente Mid-Atlantic States.

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Presented at The Scientific Meeting of the Society for Adolescent Medicine in San Diego, California, 21–25 March 2001 at the Town and Country Resort and Convention Center.

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