Screening for *Chlamydia Trachomatis* in Adolescent Males: A Cost-Based Decision Analysis

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Abstract: To evaluate the cost and benefits of screening tests for *Chlamydia trachomatis* in adolescent males, we developed a decision analysis model and compared the leukocyte esterase urine dipstick test with culture, with direct-smear fluorescent antibody (DFA), and with the option of no screening (no treatment). The leukocyte esterase test has the lowest average cost-per-cure ($51) compared with direct-smear fluorescent antibody ($192) and culture ($414). Compared with the DFA, we estimate that the leukocyte esterase test saves over $9,727 per cohort of 1,000 sexually active adolescent males screened. Sensitivity analyses show the leukocyte esterase test results in a lower cost-per-cure and lower overall costs (per cohort) than culture and direct-smear fluorescent antibody at any prevalence of *C. trachomatis* infection, and lower overall costs (per cohort) than no screening at prevalences above 21 percent. (*Am J Public Health* 1990; 80:545–550.)

Introduction

Infections caused by *Chlamydia trachomatis* are among the most prevalent and costly in the United States. Over four million chlamydial infections occur each year at a cost exceeding $1.5 billion dollars.[1,2] Adolescents have the highest rates of chlamydial infection and associated complications of any age group.[3–5] Considerable attention is now being focused on young women at risk for contracting *C. trachomatis* because of the dire reproductive consequences of a chlamydial infection. These include mucopurulent cervicitis, acute pelvic inflammatory disease, ectopic pregnancy, infertility, and maternal and infant infections during pregnancy and following delivery.[6–8]

Young men are equally at risk for a chlamydial infection. *C. trachomatis* causes approximately 50 percent of the reported cases of nongonococcal urethritis among males, and is also responsible for over 50 percent of cases of acute epididymitis in young men[8]; epididymitis is a painful, serious complication of chlamydial infection that could result in sterility. Moreover, infected adolescent males, particularly the 30 percent with asymptomatic chlamydial urethritis, represent the major source of *C. trachomatis* transmission to teenage females.[4,9]

Nevertheless, limited resources and limited availability of diagnostic tests have dictated the need to focus on screening females first. With newer, inexpensive and reliable tests now available, however, routine screening of males should be considered and evaluated. In this article, we evaluate the cost and benefits of the three commercially available screening methods for *C. trachomatis* in a population of adolescent males at risk for infection. We compare the leukocyte esterase urine dipstick test to urethral culture, to antigen detection* of a urethral smear, and with the option of not screening or treating.

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*Direct-smear fluorescent antibody (DFA) examination. Commercially available as Microtrak (tradename), manufactured by Syva Diagnostics.

Methods

Decision Analysis Model

We used a decision tree (Figure 1) to evaluate the possible outcomes associated with three screening tests for *C. trachomatis* in a population of adolescent males: 1) leukocyte esterase (LE) urine dipstick with a 1+ or 2+ reading on first catch urine; 2) urethral culture; and 3) antigen detection* (DFA) or a urethral smear. These were compared with the option of no screening (no treatment). Baseline probabilities used in our model were obtained from published data (Table 1). Our denominator for calculating baseline outcomes and costs is a cohort of 1,000 sexually active adolescent males.

Data and Assumptions

Chlamydia Prevalence (Node 1): We used 15 percent as the baseline prevalence to be conservative in estimating outcomes, but we also performed sensitivity analyses** to test the effect of using different prevalences on our conclusions.[4,9–14]

Sensitivity (Node 2) and Specificity (Node 3) of Screening Test: We used a conservative sensitivity estimate of 75 percent.[10,11] Since many false positive dipstick tests will be due to the presence of *N. gonorrhoeae*, for which at least 85 percent of strains are susceptible to tetracycline,[15] and has sequelae for uncured cases similar to that of *C. trachomatis*, we assumed a specificity of 85 percent based on results of screening only asymptomatic males.[11] Test sensitivity and test specificity for culture of *C. trachomatis* were assumed to be 90 percent and 99 percent, respectively.[16] For the DFA test we estimated the sensitivity to be 80 percent and the specificity to be 97 percent.[17,18] We performed a sensitivity analysis of the LE test through the range of probabilities in Table 1.

Follow Up (Node 4): When there is a delay between taking a test and the availability of results, some patients will be lost-to-follow-up. We used a loss-to-follow-up rate of 3 percent (range 3 to 10 percent) for the culture and direct-smear (DFA) test, because in most clinical settings results are not available for one to three days after obtaining a specimen. This follow-up rate is based on a high yield, cost-effective, field follow-up method of tracking males with positive chlamydial tests.[19] Results from the LE urine dipstick are

**Sensitivity analysis is the process of varying assumptions in a decision analysis.

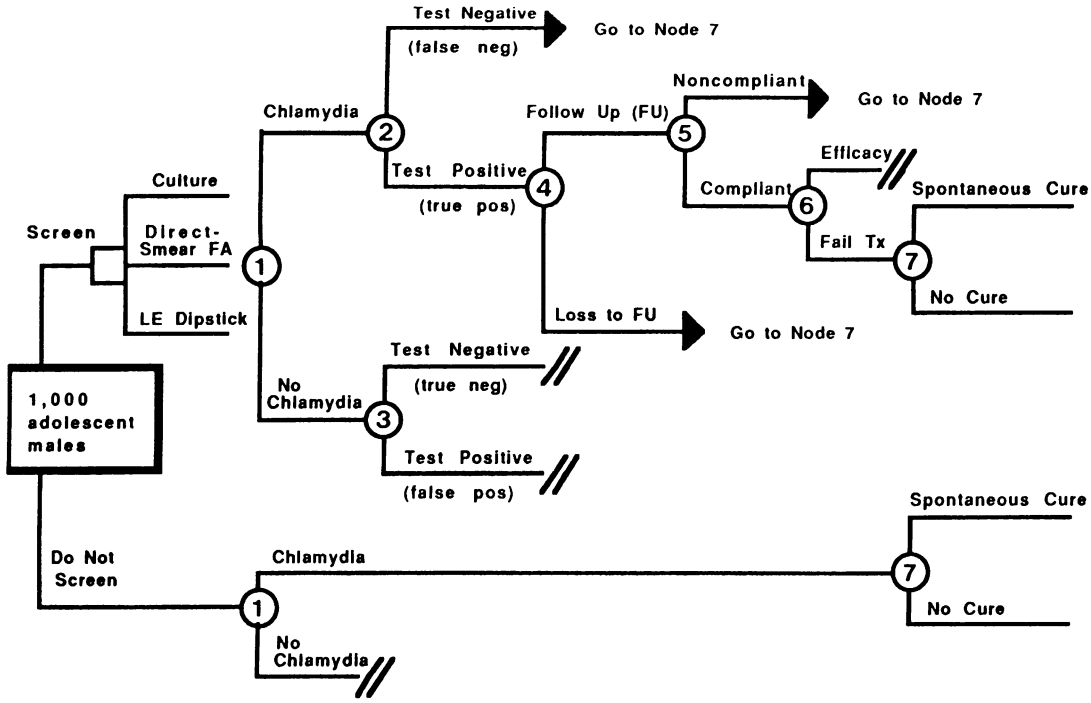

FIGURE 1—Decision Tree Depicting Outcomes for Screening (with three different tests) or not Screening for *Chlamydia trachomatis* in Adolescent Males. Squares indicate decision nodes; circles, chance nodes; and asterisk, sexually active adolescent males.

TABLE 1—Probabilities Used in Decision Analysis

	Probability		
	Baseline %	Range %	Reference
Prevalence of chlamydia	15	5–35	4,9–14
Sensitivity of leukocyte esterase	75	65–85	10,11
Specificity of leukocyte esterase	85	75–95	10,11
Sensitivity of culture	90		16
Specificity of culture	99		16
Sensitivity of direct-smear fluorescent antibody	80		17,18
Specificity of direct-smear fluorescent antibody	97		17,18
Loss-to-follow-up rate	3	3–10	19
Compliance with treatment	65	65–95	20–22
Effectiveness of treatment	95		15,23
Spontaneous cure rate	5		8
Pelvic inflammatory disease rate (infected partners)	20	10–30	3,26,29
Probability of infecting a female	30	20–40	19

generally available immediately, therefore we assumed no loss-to-follow-up for this screening test.

Compliance (Node 5): We conservatively estimated the compliance to be 65 percent (range 65 to 95 percent) in this population based on studies that show: a compliance rate of 66 to 79 percent of men treated with a five-day course of doxycycline for *N. gonorrhoeae*,[20] and an overall compliance rate for pediatric populations of approximately 50 percent, with a range of 20 to 80 percent.[21,22] We assumed that noncompliers had failed treatment, and that only those with spontaneous cure (5 percent) were free of disease.

Efficacy of Treatment (Node 6): Cure rates for the tetracyclines in treatment of chlamydial urethritis in males range from 91 percent to 99 percent.[15,23] We used a cure rate of 95 percent for our base-line analysis, the mean rate from published reports. Theoretically, other drug regimens such as trimethaprim-sulfamethoxasole[15] could also be used with the cost estimates adjusted accordingly.

Spontaneous Cure Rate (Node 7): We assumed a spontaneous cure rate of 5 percent for infected males who did not receive treatment.[8]

Cost Estimates

This decision model used medical care costs as utilities (Table 2). Only direct costs were considered with charges used to approximate costs.

Screening Test: We surveyed several laboratories in the San Francisco Bay metropolitan area to derive an average cost of $0.50 for LE dipstick (including the cost of the urine container), $30 for culture, and $10 for DFA. The cost of collecting the tests, performing the LE urine dipstick in the office, and of packaging the DFA and culture and sending them to the laboratory was assessed as $10.

Follow-up and Loss-to-Follow-up: The cost of tracking down clients with positive cultures or positive DFA tests and arranging an office visit has been shown to be $10.67.[19] Since a fair amount of time can be spent attempting to track down

TABLE 2—Cost Assumptions Used in Decision Analysis

Leukocyte esterase urine dipstick	$ 0.50
Culture	30.00
Direct-smear fluorescent antibody	10.00
Test collection and processing	10.00
Follow-up	10.67
Loss-to-follow-up	10.67
Treatment (doxycycline hyclate)	10.00
Complications in untreated males	34.34
Infecting a female partner	366.72

persons lost to follow-up, a cost of $10.67 was included for all clients with positive cultures or DFAs lost to follow-up.

Treatment: The $10 cost of treatment includes the cost of medication and the pharmacy charge. The current bulk cost for a seven-day treatment course of doxycycline hyclate 100 mg PO bid is less than $2.[24] We added in an additional $8 charge for dispensing, storing, and ordering the medication.

Complications in Sex Partners: The average cost of infecting a female partner, including transmission to neonates, was $366.72 using the baseline PID rate of 20 percent (Appendix Table A). This estimate is based on the probabilities shown in Table 1, and costs per incident of medical care in Table 2, and published data on the probability of chlamydial complications in women and neonates and associated costs.[1,2,25,26] The Appendix provides details of these calculations. This cost was decreased to $195.38 per female by decreasing the pelvic inflammatory disease (PID) rate to 10 percent, and increased to $538.05 per female by increasing the PID rate to 30 percent. We assumed that the probability of a male infecting a female was 0.30.[19] However, this variable was also ranged from 0.20 to 0.40.

Complications in Males: The cost of return visits for symptomatic infections in untreated males was assessed to be $45 ($35 office visit plus $10 treatment) with a probability of occurrence of 75 percent. This means that only about 56 percent (1×.75×.75) of infected men will return, because 25 percent will be asymptomatic. The cost of outpatient treatment for epididymitis was assessed to be $50 with a probability of occurrence of 3.6 percent in untreated males.[2,8] The cost of inpatient treatment for epididymitis was calculated to be $1,836 with a probability of occurrence in 0.4 percent of untreated males.[2,8] This results in a total cost for complications per untreated male of $34.34.

Results

Cost Savings at Baseline Assumptions

When total medical costs and cost-per-cure are considered, screening with the LE test results in the greatest cost savings (Table 3). Screening with the LE test costs 12 percent as much as culture and 27 percent as much as the DFA. The average cost-per-cure of a chlamydial infection is $51 when the LE test is used compared with $414 per cure with culture and $192 per cure with the DFA. This cost-per-cure is unchanged by decreasing the cohort of adolescent males screened to 100. Overall, screening with the LE test will save over $28,459 per 1,000 adolescent males at risk for *C. trachomatis* infection compared with culture and $9,727 compared with the DFA.

TABLE 3—Overall Cost and Outcomes for Different Screening Strategies*

Screening Strategy	Cost		Health Outcome	
	Total	Per Cure**	Cure (%)	Unnecessary Rx
Leukocyte esterase	$23,944	$ 51	73 (49%)	219
Culture	52,403	414	84 (56%)	15
Direct-smear fluorescent antibody	33,671	192	76 (51%)	44
No screening	20,571	—	8 (5%)	0

*Per cohort of 1,000 sexually active adolescent males screened for *C. trachomatis* infection.

**Cost-per-cure = (total costs screening method minus total costs no screening)/(total cures screening strategy minus total cures no screening).

TABLE 4—Sensitivity Analysis on Seven Variables

Variables	Percent	Cost/Cure LE	Cost/Cure DFA
Prevalence			
	35	$ (−)53	$ 19
	5	$ 415	$ 795
LE Sensitivity/Specificity			
	85/95	$ 19	$ 192
	65/75	$ 93	$ 192
PID rate in infected partners			
	30	$ 0	$ 140
	10	$ 103	$ 243
Probability of infecting a female			
	40	$ 14	$ 155
	20	$ 88	$ 229
Compliance			
	95	$ (−)11	$ 86
Loss-to-Folloow-up DFA			
	10	$ 51	$ 216
Best Case*		$(−)195	$(−)137
Worst Case**		$ 619	$ 866

* = Prevalance = 35%; LE Sensitivity 85%/Specificity 95%; PID Rate 30%; Infected Partner Rate 40%; Compliance 95%

** = Prevalence = 5%; LE Sensitivity 65%/Specificity 75%; PID Rate 10%; Infected Partner Rate 20%; Compliance 65%.

Health Outcomes at Baseline Assumptions

Screening with culture results in the highest percent cure rate (56 percent) per 1,000 adolescent males (Table 3). Screening with the DFA results in the second highest percent cure rate (51 percent), while the LE results in the lowest percent cure rate of the three tests (49 percent). The strategy of not screening results in a 44 to 51 percent lower cure rate than any of the three screening options. Fewer patients will be treated unnecessarily with culture and direct-smear (DFA) screening compared with the LE test (see Table 3).

Sensitivity Analysis and Break-Even Prevalence

Sensitivity analyses were performed on seven variables (Table 4). Because the LE test and the DFA appear to be the more practical options for screening, culture was not included in the sensitivity analysis.

At base-line assumptions, the disease prevalence which leads the LE test to break even when compared with the cost of not screening is 21 percent. Above this prevalence, the LE test always costs less than not screening. The break even prevalence for the DFA is 41 percent. Using base-line assumptions, the LE test will be less costly than the DFA at any prevalence. As the prevalence is lowered to 5 percent, the cost/cure for the LE rises to $415 and for the DFA to $795.

Increasing the sensitivity/specificity of the LE test will, as expected, make the LE test even more cost-effective (lower cost-per-cure, and/or lower total costs and higher or equivalent cure rate) compared with the DFA. Even at the lowest sensitivity/specificity for the LE, the cost-per-cure is still only 48 percent of the cost of the DFA.

Increasing the PID rate in infected partners to 30 percent results in the LE breaking even compared to not screening. The DFA would still cost $140 per cure. Decreasing the PID rate to 10 percent results in the LE costing $103 per cure with the DFA costing $243 per cure. Increasing the probability of infecting a female to 40 percent results in the LE test costing $14 per cure and the DFA costing $155 per cure. Decreasing the probability of infecting a female partner to 20 percent

results in the LE costing $88 per cure and the DFA costing $229 per cure.

If the loss-to-follow-up for culture and the DFA is raised to 10 percent, the percent cure rate for culture is still the highest (53 percent), with the LE next (49 percent) and the DFA the least effective (47 percent cure). The cost per cure for the DFA rises to $216 compared to $51 for the LE. If the loss-to-follow-up rate is 7 percent, the percent cure rate for the LE is equal to the DFA.

If the compliance rate were increased to 95 percent with all other variables at base-line, the LE would save $11 per cure (cost-per-cure = $51 at 65 percent compliance) and the cost-per-cure for the DFA would drop to $86 (from $192 at 65 percent compliance).

If the "best case" scenario for use of screening tests is applied (high sensitivity/specificity of tests, high prevalence of disease, high PID rate in infected partners, high probability of infecting a partner) the LE saves $195 per cure, the DFA saves $137 per cure, and culture saves $6 per cure. If the "worst case" scenario for use of screening tests is applied (low sensitivity/specificity of tests, low prevalence of disease, low PID rate in infected partners, low probability of infecting a partner) then the LE costs $619 per cure and the DFA costs $866 per cure.

Discussion

Our analysis indicates that the leukocyte esterase (LE) urine dipstick test, when used to screen for *Chlamydia trachomatis* in a population of sexually active adolescent males results in greater cost savings than screening with either DFA or culture. This finding is true throughout the range of sensitivity analyses for seven separate variables. Moreover, screening with the LE urine dipstick test in this population can result in an equivalent number of cures if the loss-to-follow-up rate for the DFA test is greater than 6 percent. These findings clearly underscore the effectiveness and substantial benefits of the LE test and support its use in this at risk population that is currently not routinely screened.

In populations where contacting patients with test results and treatment recommendations is not problematic and the prevalence of *C. trachomatis* is very high, the cost-per-cure for the DFA is substantially reduced. The higher costs associated with use of the DFA over the LE must be balanced against the high incidence of unnecessary treatment resulting from the lower specificity of the LE test. Since the LE false positive rate was established using cultures which probably have <90 percent sensitivity,[17] the LE may be detecting infections which would be missed by DFA or culture. We also recognize that some false positive LE dipstick tests in adolescent males are due to the presence of *N. gonorrhoeae* so that treatment unnecessary for the eradication of chlamydia would ultimately be of benefit. We did not attempt to place a value (or utility) on the outcome of unnecessary treatment. While the morbidity associated with tetracycline therapy in males is certainly minimal, the psychosocial consequences of inappropriate diagnosis and unnecessary treatment could conceivably impose a heavy burden on these young males and their sex partners.

Recognizing that the specificity of the LE test is much lower than that estimated for the DFA, and that precise identification of an infecting organism has potential therapeutic and health education value, have led practitioners to advocate the use of the LE as a screening test leading to further testing with culture or DFA.[10,11] Although use of this strategy would decrease the number of unnecessary treatments, the number of cured chlamydial infections would be lowered due to the combined false negative rates of both tests. Overall costs and cost-per-cure would be increased when compared with use of the LE alone. In populations where the prevalence of chlamydial infection is high and few patients are lost to follow-up, the cost-per-cure for the DFA may be acceptable enough for use as a screening test. In these populations, the higher expense for the DFA compared with the LE may be offset by the decreased number of unnecessary treated patients. Use of the LE as a predictor for further testing may be most beneficial in populations with a low prevalence of chlamydial infection and a high rate of follow-up, since the low specificity of the LE has the greatest relative impact in terms of unnecessary treatments at low disease prevalences.

Compliance with treatment is an important variable that significantly impacts the total costs and cost-per-cure for each screening strategy. If compliance with treatment could be increased to 95 percent, screening with the LE would save money over no screening. Similarly, increasing the compliance with treatment significantly reduces the cost-per-cure for the DFA and, if the follow-up rate was also high, some practitioners may find the cost-per-cure for the DFA to be in an acceptable range even at moderately low prevalences.

Our analysis focused on screening only for *C. trachomatis* with the LE test when the studies we cite[10,11] which determined the effectiveness of the LE test actually addressed both *C. trachomatis* and *N. gonorrhoeae* in asymptomatic adolescent males. The sensitivities and 100 percent specificities found in these studies were based on confirmed infection with either *C. trachomatis* or *N. gonorrhoeae,* or both. Since the sensitivity was 100 percent in one study, and the specificity was 100 percent in the other, our conservative sensitivity and specificity assumptions of 75 percent and 85 percent for the LE should absorb the effect of *N. gonorrhoeae.*

As with the LE, the sensitivity and specificity of the DFA in this population of all sexually active adolescent males are unknown. The DFA test was evaluated in men with symptoms or signs of urethritis and has not been evaluated in low-risk, asymptomatic men.[17] The sensitivity and specificity may be lower in adolescent male asymptomatic carriers. The LE test is aimed at detecting the pool of asymptomatic adolescent males who may be the main transmitters of infection to adolescent females. Sensitivity and specificity of the DFA test are also highly dependent on the skill and expertise of the microscopist interpreting the slide.[17] In laboratories with inexperienced technicians, the number of false-positive and false-negative results will bring the sensitivity and specificity toward the lower end of the spectrum.

We did not include in our analysis the strategy of empiric treatment of all sexually active adolescent males attending a clinic or physician's office. One study of patients at a sexually transmitted disease (STD) clinic[27] found this strategy to be the most cost-effective when compared with the strategies of culturing all patients and only treating those with positive results; empirically treating patients at high risk and culturing those at low risk; and empirically treating patients at high risk and neither culturing nor treating those at low risk. We initially evaluated this strategy and found it resulted in cost-per-cure of $(-)14, with 95 cures, 55 no cures, and 850 unnecessary treatments per 1,000 adolescent males. However, we elected not to present the empiric treatment data in

our comparative decision analyses because we agree with other investigators that this is not a feasible health policy option.[27] Not only would there be no basis for determining frequency of treatment, except perhaps level of sexual activity, but deciding about treatment of sex partners would also prove difficult. Furthermore, indiscriminate use of tetracycline could adversely affect antimicrobial sensitivity patterns, leading to resistant *N. gonorrhoeae* and possibly *C. trachomatis* as well.

The major costs associated with adolescent male chlamydial infection result from the costs associated with infecting a female partner. Although we have data to support the incidence of sequelae from chlamydial infection in females, and the associated costs resulting from the medical management of these sequelae, there are no firm data on the transmission rate from males to their female sexual partners. Recognizing that the transmission might have been from female partner to the adolescent male, that some adolescent females might already be infected with the same serovar of *C. trachomatis* from another partner and cannot be reinfected, and that the transmission rate is probably lower than 100 percent, we conservatively assumed that an infected male has a 0.30 change of infecting a female. Studies have shown that 30 percent of reported female partners of males with urethritis will be infected with *C. trachomatis*.[19] Since many adolescents have multiple sexual partners and may not report all of these partners, our sensitivity analysis which ranges the probability of infecting a female from 0.20 to 0.40 should cover any inaccuracy surrounding this variable.

These considerations notwithstanding, our analysis provides reasonable estimates of the risks, benefits, and costs of screening for *C. trachomatis* with the LE urine dipstick test compared with culture, DFA and not screening. Where imprecision exists, we believe it is in the direction of underestimating benefits and cost savings. For example, we did not include indirect costs, which are about equal to direct costs[2,26]; adding them would further increase the cost saving and enhance the cost-effectiveness of the LE test. Neither did we include the noneconomic benefits. These include the prevention of adverse psychosocial effects in males at risk for epididymitis and in their female partners who might later suffer from PID, ectopic pregnancy (with its resultant fetal loss and risk of maternal mortality), or infertility.

One other benefit not included in our analysis is the treatment of coexisting *N. gonorrhoeae* in adolescents diagnosed with *C. trachomatis* by the LE test. While data are not available on this coinfection rate, the rate of coexisting *C. trachomatis* in patients diagnosed with *N. gonorrhoeae* ranges from 15 to 30 percent in males and 25 to 50 percent in females.[8,13,28] Assuming the rate of coexisting *N. gonorrhoeae* in patients diagnosed with *C. trachomatis* is similar, then a significant number of gonococcal infections will be treated along with the chlamydial infection, because a seven-day course of doxycycline hyclate (100 mg PO bid) will eradicate at least 85 percent of infections due to *N. gonorrhoeae* since the highest reported rate of tetracycline resistent *N. gonorrhoeae* is 15 percent.[15,20] Importantly, treatment of these asymptomatic gonococcal infections would prevent transmission to susceptible females and subsequent adverse reproductive consequences. This would lead to even greater cost savings with the LE test compared to other screening methods and to not screening than what was calculated in our study.

The added benefits of the LE in detecting *N. gonorrhoeae* leads to combined *C. trachomatis*/*N. gonorrhoeae* treatment recommendations.[29,30] Not only does there appear to be an increasing treatment failure rate among patients with *N. gonorrhoeae* taking tetracycline exclusively,[31] but also the expected compliance with a seven-day treatment course is only 65 percent. Compliance with *N. gonorrhoeae* treatment would be raised to 100 percent if LE dipstick-positive adolescent males were given 250 mg ceftriaxone intramuscularly once or a one time oral dose of 3.5 g ampicillin/1 g probenicid before leaving the physician's office, and then given their seven-day course of doxycycline hyclate 100 mg PO bid to eradicate 95 percent of *C. trachomatis* in those who are compliant with treatment. Tracking of penicillin-resistant *N. gonorrhoeae* could be accomplished by culturing all males with a discharge, dysuria, history of exposure to a sexually transmitted infection, and/or a positive LE urine dipstick test for *N. gonorrhoeae*.

Although there are several studies that compare the costs and benefits of screening programs for *C. trachomatis* in females,[27,32,33] this is the first study that directly compares the costs and benefits of screening in adolescent males. This population represents a key link in the chain of transmission of chlamydial disease, yet routine screening of this group is not widely practiced. Since the cost-per-cure is unaffected by the size of the cohort, our analysis provides a model that practitioners can apply once they outline the characteristics of their cohort. To prevent further transmission and minimize the risk that an infected individual will have adverse consequences, clinicians should assess the prevalence and loss-to-follow-up rate in their populations, and consider using the LE urine dipstick test or the DFA, alone or in combination, for screening sexually active adolescent males to detect *Chlamydia trachomatis* infection.

APPENDIX

Cost-effectiveness Calculations

The cost of infecting a single female partner and the costs of potential neonatal transmission and its probability are calculated as shown in Appendix Table A. Appendix Table B shows the cost per *C. trachomatis* infected male assuming that 30 percent (range 20 to 40 percent) of female partners exposed by the male would become infected and have the costs and risks in Table A. We did not include potential male-to-male transmission. We assumed that 20 percent of female partners would present for treatment.[19] The cost of treating infected female partners included two outpatient visits, one DFA test, a seven-day course of doxycycline and treatment of the vaginitis expected in 10 percent of treated partners from the antibiotic therapy. Given the 20 percent false negative rate for the DFA,[17,18] we assumed that 16 percent of infected female partners would be treated with complete eradication of *C. trachomatis* and prevention of any sequelae. For the 84 percent of untreated female partners, we expected a 20 percent PID rate (range 10 to 30 percent) with the costs of treating the PID and it's sequelae listed in Table A. We predicted a 5 percent birth rate and estimated a 20 percent chlamydial conjunctivitis rate and a 10 percent chlamydial pneumonia rate in neonates born to *C. trachomatis* infected mothers. The cost of complications in males infected with chlamydia is combined with the cost of infecting female partners and the costs of potential neonatal transmission to result in an average cost per *C. trachomatis* infected male of $144.36 (Table B). The number of infected males was calculated by multiplying probability estimates down each pathway of the model and considering all those ending with "no cure" as infected and all those ending with efficacious treatment or spontaneous cures as "cured." Total costs were calculated by multiplying all "no cure" totals with the cost of infected males ($144.36) and adding this product to the following: 1) the cost of each test times the cohort; 2) the cost of follow-up and loss-to-follow-up times their probabilities of occurrence; plus 3) the cost of treatment and its probability of occurrence. This total cost calculation was divided by the number "cured" to obtain the cost-per-cure. The number unnecessarily treated equals the number of false positive tests. We used a microcomputer spreadsheet program to model the number of cures and costs.

APPENDIX TABLE A—Cost of Infecting Female Partners with *C. trachomatis* and Transmission to Neonates

	Cost	Probability	Reference
Infected female partners			
Rx fluorescent antibody		.20	
Direct-smear	$ 8	1.00	
Two outpatient visits	70	1.00	25
Vaginitis (complication Rx)	30	.10	26,27,29
7-Day course doxycycline	10	.80	
Infected female partners not Rx		.84	
PID Rate		.20	3,26,29
PID-outpatient treatment	180	1.00	25,26,29
PID-inpatient treatment	4,259	.21	25,26,29
Surgery	1,500	.12	25,26,29
Ectopic pregnancy	5,759	.04	25,26,29
Tubal infertility	2,500	.21	25,26,29
Chronic pelvic pain	200	.15	25,26,29
Birth Rate		.05	
Neonatal pneumonia	1,375	.10	7,8,25,29
Neonatal conjunctivitis	55	.20	7,8,25,29
Average cost/case	365.12		

APPENDIX TABLE B—Cost per *C. trachomatis* Infected Male

	Cost	Probability	Reference
Infected female partner & neonatal transmission	$ 365.12	0.3	Table A
Return visit symptoms	45.00	0.56	27
Epididymitis outpatient treatment	50.00	0.036	2,8
Epididymitis inpatient treatment	1,836.00	0.004	2,8
Average Cost/Case	144.36		

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