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Cost-Effectiveness Analysis of Michigan's School-Wide Sexually Transmitted Disease Screening Program in Four Detroit High Schools

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Abstract

Purpose: The Michigan Department of Health and Human Services, in collaboration with St. John Providence Health System, initiated voluntary school-wide sexually transmitted disease (STD) screenings in four Detroit public high schools. We sought to assess the cost-effectiveness of the STD screening program from 2010 to 2015, with a focus on chlamydia.

Methods: The costs and effectiveness of the school-based screening were compared with those of a "no school screening" scenario using a healthcare system perspective. A decision tree model was constructed to project cases of chlamydia, epididymitis, and pelvic inflammatory disease (PID) in each of the two scenarios among students tested positive and their partners. Health effects were measured as cases of PID prevented, and quality-adjusted life-years (QALYs) gained. Cost estimates included program costs, chlamydia testing/treatment costs in the absence of school screening, and treatment costs for epididymitis, PID, and PID sequelae. The incremental cost-effectiveness ratio (ICER) was measured as cost/QALY gained. Multivariate sensitivity analyses were conducted on key parameter estimates and assumptions used.

Results: Under base-case assumptions, at a total program cost of $333,848 over 5 years, the program prevented an estimated 1.9 cases of epididymitis and 17.3 cases of PID, resulting in an ICER of $38,235/QALY gained (yearly ICER ranging from $27,417 to $50,945/QALY). Of 10,000 Monte Carlo simulation runs, the yearly ICER remained ≤$50,000/QALY in 64%–98% of the simulation runs.

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Supplementary Data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jadohealth.2021.05.014.

Conclusions: We found favorable cost-effectiveness ratios for Michigan's school-wide STD screening program in Detroit. School-based STD screening programs of this type warrant careful considerations by policy makers and program planners.

Keywords

Chlamydia; School-wide STD screening; Cost-effectiveness

Many adolescents engage in sexual risk behaviors that place them at risk for HIV infection, other sexually transmitted diseases (STDs), and unintended pregnancy. Incidence and prevalence estimates suggest that young people aged 15–24 years acquire half of all new STDs each year in the United States [1]. Of all age groups, adolescents aged 15–19 years had the highest increase in the rate of reported *Chlamydia trachomatis* (CT) and gonorrhea (GC) cases during 2016–2017 (7.5% and 15.5%, respectively) [2]. The higher STD incidence among adolescents may reflect multiple barriers to accessing quality STD prevention and management services [3]. In recent years, growing public health efforts have been expended to increase adolescents' access to STD screening and treatment services [4,5]. Several cities in the United States have offered school-based mass screenings, including New Orleans, Philadelphia, Detroit, Washington, DC, New York City, Chicago, and San Francisco [6-12]. Although the two earlier programs in New Orleans (1995–1998) and Philadelphia (2001–2007) were shown to be a feasible and cost-effective approach to identify and treat a large number of asymptomatic students [7,13], no studies have assessed the cost-effectiveness of more recent programs.

Starting from the 2010 to 2011 school year, the Michigan Department of Health and Human Services (MDHHS), in collaboration with St. John Providence Health System, initiated a voluntary school-wide STD education and screening program in Detroit public high schools to identify and treat high school students infected with CT and GC. It began with one high school in the 2010–2011 school year and added an additional high school in each of the following three school years. The screening events were provided as a service of the on-site school-based health centers operated by St. John Providence Health System in collaboration with MDHHS. From 2010 to 2015, a total of 5,388 students (79% of all students enrolled) aged 14–19 years (95% were African Americans) were tested in the four Detroit schools. A total of 426 students tested positive for CT and 46 tested positive for GC. Of these, 23 students tested positive for both infections. All students who tested positive received counseling and treatment.

A previous epidemiological study of the Detroit program showed that the CT positivity rate in the four schools decreased from 10.24% in the 2010–2011 school year to 6.27% in the 2014–2015 school year [8]. However, in this cost-conscious era, it is no longer sufficient to rely solely on effectiveness to justify funding. Issues of practical concern to policy makers and program planners are cost (whether they can afford to implement a program) and cost-effectiveness (whether the effects of a program can justify its cost). The purpose of this study is to assess the cost-effectiveness of the Detroit school-wide STD screening from 2010 to 2015, with a focus on CT.

Methods

Analytical framework

We used standard cost-effectiveness analysis methods [14] to compare costs and effectiveness of the Detroit school screening program with those of a "no school screening" scenario using a healthcare system perspective. A decision tree model was constructed to project the expected number of persistent CT infections or reinfections, epididymitis, and pelvic inflammatory disease (PID) each year and in each of the two scenarios. Health effects were measured as cases of PID prevented, and quality-adjusted life-years (QALYs) gained. Three types of cost were considered: program costs, costs of CT testing and treatment in the absence of the school screening, and costs of treatment for epididymitis, PID, and PID sequelae. The time frame for estimating the number of cases of CT infections, epididymitis, and PID was 1 year post the school screening, and the analytic horizon extended to 20 years after development of PID to incorporate QALY losses and medical treatment cost associated with PID sequelae. Cost-effectiveness was expressed in the form of an incremental cost-effectiveness ratio (ICER) and was measured as cost per QALY gained compared to "no school screening." Future QALY losses and medical costs were discounted at 3%, and all costs were in 2015 dollars.

Program cost

Prior to school screening events, parents were given the opportunity to opt their student out of the screening events in accordance with school's policy for communications. On event days, students were called by classroom from a core class to the auditorium where they received a short educational session. Subsequently, all students were given a consent form, patient information sheet, and a brown paper bag with a urine specimen cup. After completing the forms, all students were asked to proceed to a bathroom stall where they privately chose whether to provide a specimen or not. Afterwards, all students returned the paper bag to a bin monitored by event staff. All samples were pipetted on-site and packaged for transport to the state laboratory. The program hosted several full-day events each year and a couple of make-up day events in years 2 and 3. In the days after screening, to protect student confidentiality, all students who tested positive and approximately one third of students who tested negative were contacted to come to the clinic. Students with positive results received result counseling and 1 g of azithromycin treatment. Students with negative results received risk reduction counseling. The data we used in estimating program cost are available in Table A1 of the online supplement. Personnel costs on a full-day event were estimated as the product of the number of staff, staff time spent on a full-day event and preparation for the event, and staff time cost (salary, fringe benefits, overhead). Personnel costs on a make-up day event were calculated as the product of average personnel cost per student tested on a full-day event and the number of students tested on a make-up day event. Personnel costs on counseling and treatment were calculated as the number of staff, staff time spent on counseling and treatment per student, number of students counseled and treated, and staff members' hourly cost. Other costs included cost of specimen bags, testing kits, laboratory supplies, medication, transporting samples to the state laboratory, and cost of laboratory services. Although the program received laboratory services in-kind from the MDHHS, we included laboratory service costs. We used a published estimate of $3.97

($6.26 in 2015 dollars) from Howell et al. [15] as the cost of laboratory technician time and laboratory overhead per specimen.

Persistent Chlamydia trachomatis *infections/reinfections, epididymitis, and pelvic inflammatory disease among infected students*

We constructed a decision tree model to project the expected number of persistent CT infections/reinfections, PID, and epididymitis among infected students (those who tested positive via school screening) in the coming year in both the school screening scenario and the "no school screening scenario." Figure 1 shows the model for infected female students. In the school screening scenario, all female students who tested positive were treated. Only those who experienced treatment failure or reinfection were at risk of developing PID. In the absence of the school screening scenario, some of those infected female students could be tested at a clinical setting due to symptomatic infections or recommended CT/GC screening for all sexually active female adolescents. For those who were not tested or had false negatives, we considered the probability of natural clearance. In this study, for simplicity, we used the term "persistent infections" for all infections persisting to the next year due to not being tested, having false negatives, or treatment failure. Female students who experienced either persistent infection or reinfection were at risk of developing PID. The difference in the expected cases of PID between the two scenarios were considered the number of PID averted by the school screening. Infected male students followed a similar decision tree except that epididymitis was included as an outcome instead of PID.

Chlamydia trachomatis *transmission infections averted among partners of students with persistent* Chlamydia trachomatis *infections/reinfections*

Students who had persistent CT infection or reinfection could transmit infections to their uninfected or cured partners. Focusing on the partners of students who had persistent CT infection or reinfection in the next year, we estimated the impact of the school screening program on one-generation infection transmission prevented. Figure A1 (Supplement) shows the disease pathway in female partners of male students who had persistent CT infection or reinfection. Using the 2011–2015 Michigan youth risk behavior survey data, among sexually active African American students, we estimated that male students had 1.98, 2.15, and 1.66 partners and female students had 1.24, 1.37, and 1.25 partners in the past 3 months in the years 2011, 2013, and 2015, respectively [16]. Using the number of partners, the number of students who had persistent CT infections or reinfections in each of the two scenarios, the probability of a partner being uninfected (1 – prevalence), and transmission probability, we calculated the number of uninfected partners who would be infected in each of the two scenarios. The differences in the number of PID between the two scenarios were the number of cases prevented. Using the same approach, we also estimated the number of epididymitis cases prevented among male partners of infected female students.

Table 1 summarizes all the parameters used in the cost-effectiveness analysis, including the base-case values, ranges for sensitivity analysis, and data sources. We used published literature to derive estimates for test sensitivity [17], treatment efficacy [17], probability of reinfection [18,19], probability of natural clearance per infection [20], probability of transmission [21], and probability of developing epididymitis [22] or PID [7,17,22-25].

For probability of reinfection among female adolescents, we used a published estimate of a 5-year probability of reinfection among those attending family planning clinics in our base-case analysis to address the concern that the burden of disease may reoccur over a longer period, and included the highest probability of reinfection in our sensitivity analysis [18]. For the probability of background testing, we assumed that both male and female students with symptomatic infections would get tested. Gift et al. [22] showed symptomatic CT infections were 50% in males and 20% in females. For infected female students with asymptomatic infections, we used a CT testing rate of 44% from a Center for Disease Control and Prevention study of the 2012 Michigan Medicaid-enrolled sexually active female adolescents aged 13–18 years (personal communication, Michelle Van Handel). There has been considerable debate in the literature among experts about the true probability of developing PID among females with untreated CT infection. Some studies [7,23,24] used 30% for both symptomatic and asymptomatic PID and others used 15% for symptomatic PID only [17,22]. Price et al. [25] reappraised evidence from randomized controlled trials of screening and controlled observational studies and found that the probability that a CT episode will cause clinical PID was 16%, which ranged from 12% to 17%. In this study, we used Price's 16% in our base-case analysis and used the range of 12%–30% for sensitivity analysis. For all the other parameters, we selected estimates that have been used in previous cost or cost-effectiveness studies of sexually transmitted infection screening/testing [26].

Medical costs saved and quality-adjusted life-years gained

Estimates of the medical cost per case of epididymitis and PID were directly obtained from published studies [17,26] (Table 1). The cost per case of PID included the average lifetime cost of PID and its sequelae (ectopic pregnancy, chronic pelvic pain, and infertility). Estimates of QALYs gained per case of epididymitis and PID prevented were obtained from our previous study [27] (Table 1). The estimate of QALY lost associated with epididymitis considered both outpatient and inpatient care. The estimate of QALY lost associated with PID considered acute PID and PID sequelae. We multiplied unit cost and QALY lost per case of epididymitis or PID with the number of cases prevented to calculate total medical costs saved and QALYs gained associated with cases of epididymitis and PID prevented.

Chlamydia trachomatis *testing and treatment costs in the absence of school screening*

We first estimated the number of students who would be tested and treated in a clinical setting in the absence of the school screening. Among male students who participated in school screening, we assumed that only those who had symptomatic CT infections would seek care and be tested. Among all female students who participated in the school screening, we assumed that all students with symptomatic infections would have been tested and all the other sexually experienced students would have a 44% chance to be tested based on the Center for Disease Control and Prevention Medicaid study (personal communication, Michelle Van Handel). Detroit youth risk behavior survey data showed that 58.0%, 38.3%, and 34.3% of female African American students reported ever had sexual intercourse in the years 2011, 2013, and 2015, respectively [16]. All students who tested positive in a clinical setting would be treated. We applied published cost estimates of CT testing and treatment in a clinical setting to our estimated number of students who would be tested and treated in a

clinical setting to calculate the total CT testing and treatment costs in the absence of school screening.

Sensitivity analysis

In our base-case analysis, there was uncertainty in the assumptions used and parameter estimates derived in the previously published studies. To test how those assumptions and parameter estimates affected the main results, we conducted a multivariate sensitivity analysis by varying all major parameter values over a wide range that we considered plausible assuming a triangular distribution of values for all parameters. Monte Carlo simulation of 10,000 trials was performed using @RISK (Palisade Corp., Newfield, NY).

This study used secondary data for analyses; institution review board approval was not required.

Results

As shown in Table 2, the estimated yearly program costs ranged from $33,448 to 87,283 as the number of event days hosted and the number of students tested varied across different school years. The average program cost was $66,770 per year, and the large cost items were personnel (68%), testing kits and reagents (19%), and laboratory technician time and overhead (10%). The average program cost per student tested ranged from $56 to $86 over the 5 years, with the lowest in year 3 and the highest in years 1 and 2. The main driver of the variation is the number of students tested per day, which increased greatly starting from year 3 (Table A1). The average program cost per student tested positive ranged from $678 to $985 over the 5 years, with the lowest in year 3 and the highest in year 5.

As shown in Table 3, among students who tested positive via school screenings, the Detroit program prevented an estimated 119.8 cases of persistent CT infections or reinfections, 12.9 cases of PID, and 0.8 case of epididymitis over 5 years. Among uninfected partners of students with persistent CT infections or reinfections, the program prevented an estimated 81.6 cases of CT infections, 4.4 cases of PID, and 1.1 cases of epididymitis.

In the absence of school screening, based on the assumptions we made about background testing, an estimated 61, 133, 150, 146, and 97 students would have been tested at a clinical setting and an estimated 23, 47, 63, 57, and 39 students would have been treated in the year 1, 2, 3, 4, and 5, respectively. As a result, without school screening, an estimated $4,215, $9,035, $10,471, $10,105, and $6,715 testing and treatment costs would have occurred in the year 1, 2, 3, 4, and 5, respectively.

Table 4 summarizes the cost-effectiveness results of both the base-case analysis and the sensitivity analysis. Under base-case assumptions, at a total program cost of $333,848 over 5 years, the program prevented an estimated 1.9 cases of epididymitis and 17.3 cases of PID, resulting in 6.0 QALYs gained, and $64,960 medical costs saved. In the absence of school screening, over 5 years, a total of 587 and 229 students would have been tested and treated, respectively, resulting in a total of $40,541 testing and treatment costs. Compared to “no school screening,” the Detroit program would yield an ICER of $38,235/QALY gained

over 5 years, ranging from $27,417 to $50,945/QALY each year. The program was most cost-effective in year 3 and least cost-effective in year 5. This is consistent with the program cost per student tested positive being the lowest in year 3 and the highest in year 5. The program was most cost effective in year 3 because it had not only the highest number of students tested per day but also the highest number of students tested positive. Part of the reason that the program was least cost effective in year 5 is because it had the lowest test positive rate, and this was because the program had been effective in dropping prevalence in these schools by that time [8].

From sensitivity analysis, the most influential model input parameter is the probability of developing PID with an untreated CT infection (contributing to 37%–39% of the variance of the ICER each year), followed by the number of QALYs gained per case of PID prevented (24%–31% of the variance) and the probability of background testing among infected female students (11%–13% of the variance). Although the results were sensitive to variations in the major parameter estimates, of 10,000 Monte Carlo simulation runs, the yearly ICER remained ≤$50,000/QALY (a relatively conservative and widely cited threshold that we selected for illustrative purpose) in 64%–98% of the runs.

Discussions

In this study, we examined the yearly incremental cost-effectiveness of the Detroit school-wide screening program from 2010 to 2015 school years. The program would cost an estimated $38,235/QALY gained per year over the 5 years, ranging from $27,417 to $50,945/QALY each year. Although the results were sensitive to variations in the major parameter estimates, the cost per QALY gained each year remained below $50,000 in 64%–98% of the 10,000 simulation trials. The results of this study suggest that the Detroit program has the potential to be more cost-effective if (1) the program can test more students on an event day and/or (2) the program is replicated in areas with sexually transmitted infection prevalence higher than those in the four schools. In areas with similar prevalence as those in the four schools, replicating the Detroit program is highly likely to be a cost-effective investment of public money, especially in areas with lower background testing.

The findings of this study are generally consistent with those of two early studies of school-wide STD screening programs. An earlier economic evaluation of the New Orleans school-wide STD screening program (1995–1998) found the program was cost-saving (saving $1,524 while preventing 1 case of PID) [13]. A later cost-effectiveness study of the Philadelphia school-wide STD screening (2002–2007) showed the program was highly cost-effective (cost $500–$3,500 per QALY gained) relative to other commonly accepted interventions [7]. Although our effectiveness measures are different from that of the New Orleans study and our model is different from that of the Philadelphia study, the findings of this study and the two early studies suggest that school-wide STD screening programs are likely to achieve moderate to high participation rates (35% in Philadelphia, 52% in New Orleans, and 79% in Detroit) and are likely to be a cost-effective approach to reduce the burden of STDs among adolescents.

Since 2006, several national guidelines have recommended CT and GC screening of all sexually active females under 25 years of age [28-30]. However, a clear gap exists between the expected level of CT testing and the actual rate of testing in clinical settings [31]. Although 31% of high school students were sexually active in 2011 in New York State (NYS), only 18% of female adolescents and 8.6% male adolescents enrolled in the NYS Medicaid program were tested for CT infection [31]. In Michigan, among sexually active female adolescents aged 13–18 years who enrolled in the Medicaid program and had reproductive services in 2012, only 44% were tested for CT infection (Personal communication, Michelle Van Handel). In addition, if infected male adolescents remain untreated, they may not only develop epididymitis but also transmit infections to their uninfected or cured female partners. School-wide STD screening represents a unique opportunity to fill the gap of STD screening in sexually active female adolescents and provide sexually active male adolescents with much needed testing and treatment.

Conducting school-wide screening takes coordination and cooperation among schools, health departments, community organizations, parents, and other stakeholders. Schools can play an active role in initiating, promoting, and coordinating screening efforts. In areas with high STD incidence, schools can (1) use local STD rates and trend data to persuade community stakeholders of the need for screening; (2) reach out to state or local health departments and local health care providers to develop partnerships for on-site screening; and (3) schedule and coordinate screening events, including communicating with teachers, students, and parents about the screening event; recruiting students and ensuring the time, space, and confidentiality needs of such an event are met.

The Detroit program was a collaboration between MDHHS and the school-based health centers. The MDHHS paid for everything except the personnel time of the school-based health center staff. For replicating the program in other areas, schools can work with public health agencies and community healthcare providers to bring mass STD screenings to schools, regardless of which source of public funds pays for the program.

As with all model-based cost-effectiveness studies, our study has some limitations. First, our study only focused on the number of persistent chlamydia infections and reinfections prevented among students tested positive in the year following the school screening; there may be more transmissions prevented as well as more reinfections over a longer period. To address the concern that the burden of disease may reoccur over a longer period, we used a published estimate of a 5-year reinfection rate among female adolescents attending family planning clinics in our base-case analysis and included the highest published female reinfection rate in our sensitivity analysis [18]. Second, there is uncertainty in the major parameter estimates derived in the published studies or this study, although we have conducted sensitivity analysis by varying the major parameters over a wide range that we considered plausible. Third, we assumed that students who were tested and treated would not develop PID or epididymitis. It is possible that the damage would have been done by the time CT infection was detected and treated. However, because we used the probability of CT-caused clinical PID in our base-case analysis, the chance for a female student already having a clinical PID at the time of school screenings should be small. Fourth, in this study we only considered the benefit of identifying the CT infections, not the benefit of identifying

23 cases of GC infections due to lack of available data for GC progression. However, this limitation only led to more conservative cost-effectiveness results.

In conclusion, we found favorable cost-effectiveness ratios for Michigan's school-wide STD screening program in Detroit. The program not only reduced the prevalence in the intervention schools over 5 years, but also did so in a cost-effective manner. School-based STD screening programs of this type warrant careful considerations by policy makers and program planners.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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IMPLICATIONS AND CONTRIBUTION

This study found favorable cost-effectiveness ratios for Michigan's school-wide sexually transmitted disease screening program in Detroit. The program not only reduced the prevalence in the intervention schools, but also did so in a cost-effective manner. School-based sexually transmitted dis-ease screening programs of this type warrant careful considerations by policy makers and program planners.

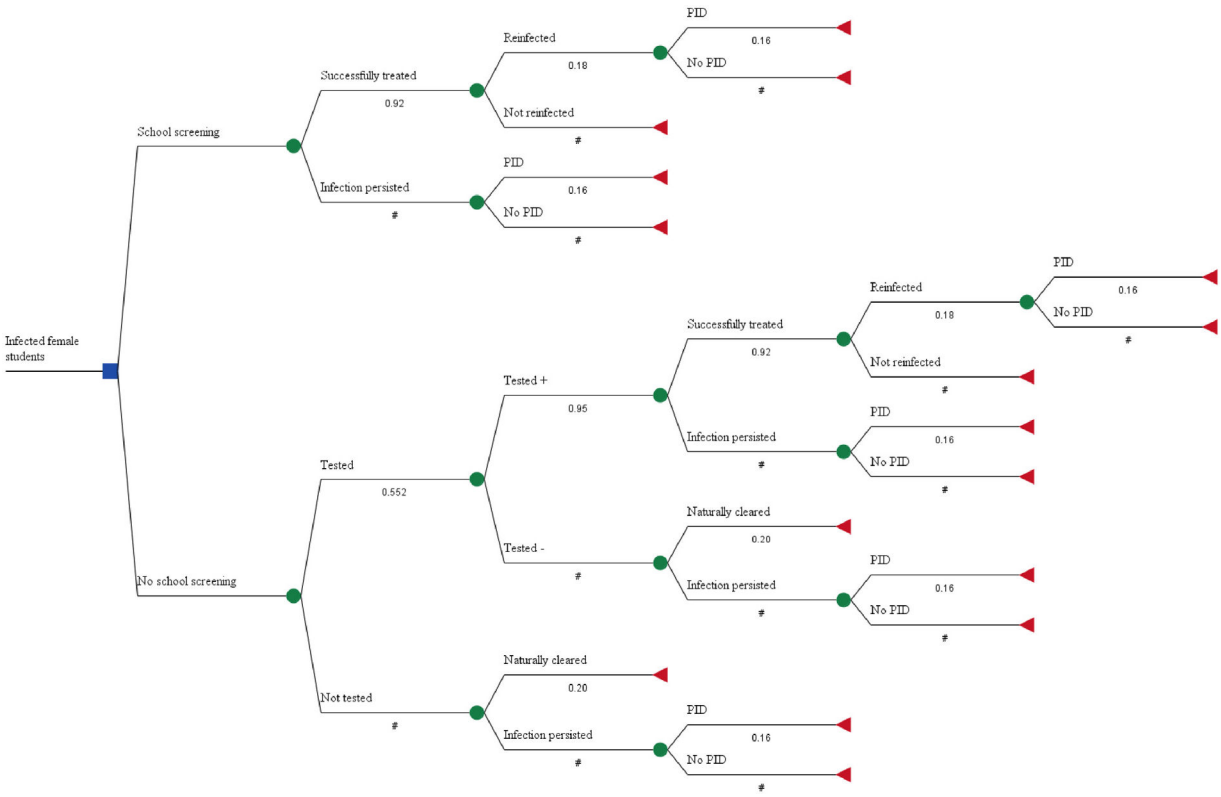

Figure 1.
Disease pathway in infected female students. PID = pelvic inflammatory disease.

Table 1

Major parameters used in the cost-effectiveness analyses

Parameters	Value	Range	Reference
Probability of background testing			
Male, among those tested positive	.50	.20–.50	Authors' assumption that only male students with symptomatic infections would get tested, 50% probability of symptomatic infection [22]
Female, among those who were sexually active	.44	.22–.66	Center for Disease Control and Prevention Medicaid study of 2012 Michigan Medicaid data (personal communication)
Female, among those tested positive	.55	.276–.728	Authors' calculation based on 20% probability of symptomatic infection [22], all symptomatically infected females would get tested, 44% of asymptomatically infected females would get tested
Test sensitivity	.95	.9–1	[17]
Treatment efficacy (azithromycin)	.92	.8–1	[17]
Probability of reinfection			
Male	.11	.065–.178	[19]
Female	.18	.09—.27	[18]
Probability of natural clearance			
Male	.20	.10–.30	[20]
Female	.20	.10–.30	[20]
Probability of developing epididymitis or PID			
Epididymitis	.02	.01–.05	[22]
PID	.16	.12–.30	.16 (ranging from .12 to .17; [25]), .30 ([24]; [7]), and .15 ([17,22])
Transmission probability per partnership			
Male to female	.70	.25–.80	[21]
Female to male	.68	.25–.80	[21]
Clinical screening/testing and treatment costs			
Screening/testing ($)	57.50	28.7–86.2	[17]
Treatment ($)	29.80	14.9–44.7	[24]
Treatment costs of sequelae			
Epididymitis ($)	1,347	673–2,020	[17]
PID ($)	3,513	1,756–5,269	[26]
QALYs lost/case			
Epididymitis	.01	.0048–.01	[27]
PID	.34	.177–.53	[27]

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PID = pelvic inflammatory disease; QALY = quality-adjusted life-years.

Table 2

Program costs

	Year 1	Year 2	Year 3	Year 4	Year 5	Yearly average
Screening						
Personnel cost on event days ($)	22,432	47,915	39,481	50,385	39,196	39,882
Student specimen bags ($)	252	536	844	902	698	647
APTIMA collection kit and reagents ($)	4,830	10,281	16,169	17,296	13,386	12,392
On-site laboratory supplies ($)	400	800	700	900	700	700
Transporting samples to the laboratory ($)	80	200	180	180	140	156
Cost of laboratory technician time and laboratory overhead ($)	2,629	5,596	8,802	9,415	7,287	6,746
Subtotal ($)	30,623	65,329	66,175	79,078	61,407	60,523
Counseling and treatment						
Personnel cost on counseling and treatment for students tested positive ($)	1,482	2,999	4,033	3,654	2,516	2,937
Medications ($)	344	696	936	848	584	682
Personnel cost on counseling for students tested negative ($)	999	2,138	3,415	3,703	2,890	2,629
Subtotal ($)	2,825	5,832	8,383	8,205	5,990	6,247
Total program cost($)	33,448	71,162	74,558	87,283	67,397	66,770
Program cost per student tested ($)	86	86	56	62	62	70
Program cost per student tested positive ($)	836	879	678	878	985	851

Table 3

Number of chlamydia, epididymitis, and PID prevented (base-case analysis)

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Infected students						
No. of persistent CT infections and reinfections prevented						
Male	3.3	9.4	9.8	10.1	6.8	39.4
Female	8.7	15.3	22.9	19.8	13.7	80.4
No. of PID prevented	1.4	2.4	3.7	3.2	2.2	12.9
No. of epididymitis prevented	0.1	0.2	0.2	0.2	0.1	0.8
Uninfected partners of students with persistent CT infections or reinfections						
No. of transmission infections prevented						
Male	5.5	9.4	16.1	13.9	8.9	53.7
Female	2.2	6.4	7.4	7.7	4.1	27.8
No. of PID prevented	0.3	1.0	1.2	1.2	0.7	4.4
No. of epididymitis prevented	0.1	0.2	0.3	0.3	0.2	1.1

CT = *Chlamydia trachomatis*; PID = pelvic inflammatory disease.

Table 4

Cost-effectiveness results

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Base-case analysis						
Program costs ($)	33,448	71,162	74,558	87,283	67,397	3,33,848
No. of PID prevented	1.7	3.5	4.8	4.4	2.8	17.3
No. of epididymitis prevented	0.2	0.4	0.5	0.5	0.3	1.9
Total QALYs gained	0.6	1.2	1.7	1.5	1.0	6.0
Total medical costs saved	6,519	13,016	18,223	16,525	10,677	64,960
CT testing and treatment costs in the absence of school screening ($)	4,215	9,035	10,471	10,105	6,715	40,541
ICER ($ per QALY gained)	37,921	40,919	27,417	39,940	50,945	38,235
Sensitivity analysis						
% of simulation runs with ICER ≤$50,000/QALY gained	87.8	83.1	97.7	84.4	64.4	NA

CT = *Chlamydia trachomatis*; ICER = incremental cost-effectiveness ratio; NA = not applicable; PID = pelvic inflammatory disease; QALYs = quality-adjusted life-years.