Published in final edited form as:

Sex Transm Dis. 2014 January ; 41(1): 74–78. doi:10.1097/OLQ.0000000000000070.

Chlamydia and Gonorrhea Diagnosis, Treatment, Personnel Cost Savings, and Service Delivery Improvements After the Implementation of Express Sexually Transmitted Disease Testing in Maricopa County, Arizona

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Abstract

Background: The demand for low-cost sexually transmitted disease (STD) services in Maricopa County (Phoenix area) is high. Improved methods for STD/HIV testing are needed to increase the number of patients receiving testing.

Objectives: The present study sought to evaluate an STD/HIV express testing (ET) option for patients identified as being at lower risk for infection.

Methods: Clients reporting current STD symptoms, contact to an infected partner, or health department referral were identified via questionnaire and routed to a traditional provider visit (PV); those not reporting these situations were routed to ET (laboratory-only). Demographics, treatment completion, and treatment intervals were compared among patients diagnosed as having chlamydia and gonorrhea through ET and PV encounters in September 2008 to July 2011. Personnel costs were compared for each of the 2 visit types. The number of clinic turn-aways for the 2-month time interval before the start of the program was compared with the 2-month interval at the end of the evaluation.

Results: Of the 36,946 clients seen at Maricopa County Department of Public Health, 7466 (20.2%) were patients seen through express visits. Overall chlamydia and gonorrhea positivity was lower among ET patients (527/7466; 7.1%) as compared with those tested through PVs (6323/29,480; 21.4%). Treatment completion rates were comparable but were higher among patients seen through PVs (99%) as compared with ET (94%). A savings of \$2936 per 1000

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Publisher's Disclaimer: Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent views of the Centers for Disease Control and Prevention, the Maricopa County Department of Public Health, or the Arizona Department of Health Services

Conflicts of interest and source of funding: None declared.

patients seen was achieved when 20% of clients were routed through ET. Clinic turn-aways decreased significantly, from 159 clients during the 2 months before implementation of ET to 6 patients during the last 2 months of evaluation (96% reduction).

Conclusions: This ET system included an effective patient routing process that provided an efficient way to increase access to STD testing among persons at lower risk, at a reduced cost per patient, while maintaining high treatment coverage.

Testing and treatment of sexually transmitted diseases (STDs) are paramount as public health measures to prevent the spread of these infections and to decrease morbidity through timely diagnosis and treatment. Traditional efforts to identify, treat, and reduce STDs have included an encounter with a clinician; however, some public health clinics are experiencing increasing service demands and dwindling resources, resulting in patients being turned away.¹⁻⁶ Novel health care delivery methods have been implemented to alleviate this problem. Express testing (ET) is one such model whereby asymptomatic clients forgo a medical provider encounter and, instead, submit specimens for STD/HIV testing.¹⁻⁴ Clients are later contacted with the test results and, if positive, are advised to return for a provider visit (PV) to receive treatment.

In 2010, Maricopa County was ranked eighth of all counties and independent cities in the United States for chlamydia cases and has experienced an ongoing increase in chlamydia and gonorrhea since 2008.^{7,8} The Maricopa County Department of Public Health (MCDPH) runs the only STD clinic in the greater metropolitan Phoenix area, offering low-cost STD services (\$20 per patient includes testing and STD treatment for patient and partners) to a population of roughly 4 million people.⁹ Clients of MCDPH are served on a first-come, first-serve, walk-in basis. Services include the following: counseling, testing (chlamydia, gonorrhea, syphilis, and HIV), treatment (chlamydia, gonorrhea, syphilis), and partner notification and referral. In 2008, MCDPH introduced an ET system where asymptomatic patients could submit urine and serum specimens for chlamydia, gonorrhea, syphilis, and HIV testing without undergoing a physical examination. Before the implementation of ET, a medical provider (physician assistant or nurse practitioner) evaluated each patient. An analysis was undertaken to evaluate the potential public health benefits of this testing option. Specifically, this study assesses the demographics and treatment outcomes of chlamydia and gonorrhea cases diagnosed through the express system in comparison with a traditional PV. In addition, personnel cost savings and delivery of services during the period of implementation were evaluated.

METHODS

Study Population

The study population consisted of individuals who under-went STD testing through a PV or an ET encounter between September 1, 2008, and July 31, 2011.

PV Versus ET

All clients attending the STD clinic were asked to complete a standard questionnaire by the medical records clerk (English/Spanish) to determine their STD/HIV risk level and

symptoms. The medical records clerk routed patients to a PV if they checked “yes” for any of the following risk criteria: (a) STD related symptoms such as genital discharge or rash, dysuria, and lower abdominal pain; (b) men who have sex with men; (c) partner to an STI/HIV case; (d) injection drug use; (e) pregnant; or (f) referred by a community provider or public health investigator. Patients routed to a PV were evaluated by a medical provider (nurse practitioner or physician assistant). Asymptomatic patients not identifying any of the above criteria on the questionnaire were routed through an ET visit, during which a medical assistant collected blood and urine specimens and the patient was instructed to call back for test results.

Laboratory Testing

Regardless of the visit type, each client was offered a urine-based Aptima nucleic acid amplification test for chlamydia and gonorrhea and serum-based testing for syphilis (rapid plasma reagin) and HIV (EIA; Abbott Commander). All patients were instructed on how to call in by telephone within a week to obtain their test results. Laboratory results were typically available within 48 to 72 hours of specimen collection. Express testing patients with positive results and patients testing positive during the PV who had not received treatment were instructed to return to the clinic to be seen by a medical provider and receive treatment. Clients testing positive for any of the 4 infections that did not call in for their results or received results but did not return for treatment were routed to STD field services for case investigation and treatment referral.

Health Record Review

Medical and laboratory records were extracted from the MCDPH practice management system (LeonardoMD, Renaissance) for the following data elements: (a) number and proportion of each visit type during the study period; (b) demographics of patients in the ET and PV groups including age, sex, race, and ethnicity; (c) test results for chlamydia and gonorrhea; (d) treatment completion by visit type; and (e) intervals between testing and treatment in the ET and PV testing groups.

Analysis

Testing and treatment data were compiled in Excel and imported to Statistical Packages for Social Sciences, SPSS (V. 18; Chicago, IL), and SAS 9.3 (SAS Institute, Cary, NC) for analysis. χ^2 Test was used to assess significant demographic differences between clients by visit type. Multivariate analysis of correlates of visit type was performed using logistic regression controlling for demographic variables. Time to treatment was calculated in days by subtracting date of specimen collection from treatment date.

Personnel Cost Analysis

Costs were calculated from the perspective of the MCDPH STD Clinic and are presented in 2011 US dollars. To focus on STD clinic efficiency, our cost analysis was limited solely to STD clinic personnel costs. All other costs (e.g., clinic supplies, treatment regimens, sequelae costs, patient time, and transport costs) were excluded. Personnel cost comparisons and differences were calculated using hourly wage, inclusive of employee-related benefits,

for medical provider staff at \$55 per hour, for a medical assistant at \$13 per hour, and a medical records clerk at \$12.50 per hour. Visit costs were calculated by dividing salary costs of ET or provider staff by the average number of patients that were estimated to be seen per hour (5 per hour for an ET visit and 3 per hour for a medical PV). The average staff cost per client when seen by a provider was \$18.33 (hourly wage of \$55/3 clients per hour). In comparison, the average staff cost per client seen through ET was \$2.60 (hourly wage of \$13/5 clients per hour).

Adding the ET option required all patients to complete a questionnaire during the initial registration process, which was not required when only PV visits were offered. Review of the intake form by the medical records clerk to determine the appropriate service path required an average of 1 minute per patient (\$12.50 per hour/60 patients), or approximately \$0.21 per patient. This is presented as an additional cost for the implementation of ET.

Service Delivery

The numbers of patients turned away were tabulated by month during the study period. Turnaways during the 2-month period before program implementation (July 2008 through August 2008) were compared with the last 2 months of the program evaluation (June 2011 through July 2011).

RESULTS

Clinic Attendance

There were a total of 36,946 individual clients seen at MCDPH during the study period. Most clients ($n = 29,480$; 79.8%) were routed to PVs rather than ET (7466; 20.2%; Table 1). Clients were mostly men (ET 65%, PV 64.8%). Of those attending PV most were white (30.6%) or Hispanic (45.5%), with similar results among patients seen in ET (white 46.7%; Hispanics 33.2%). The largest proportion of clients routed to ET and PV (27.8%) were in the age group of 20 to 24 years. In multivariate analysis, men were more likely to attend an express care visit (odds ratio, 1.1; 95% confidence interval, 1.05–1.17) when controlling for age and race/ethnicity.

Positivity

Among the 36,946 clients tested in both settings, 6850 (18.5%) had at least 1 positive gonorrhea or chlamydia test result. Positivity was significantly higher among all clients seen through PVs (21.4%) compared with ET (7.1%, $P < 0.001$). Among clients routed to ET, 10.2% of African Americans (107) and 9.5% of Hispanics (236) had a positive test result. Among patients seen in PV, 28.7% of African Americans (1480) and 23.3% of Asians (96) had a positive test result, followed by 22.3% of Hispanics (2993). Among ET and PV clients, those aged 15 to 19 years had the highest positivity rate at 15% and 34%, respectively (Table 1). Men were less likely than women to be diagnosed as having chlamydia or gonorrhea during an ET visit when controlling for age and race/ethnicity (odds ratio, 0.6, 95% confidence interval, 0.5–0.7).

During the study period, 5402 chlamydia cases and 966 gonorrhea cases were diagnosed through the clinic. There were 482 additional chlamydia/gonorrhea coinfections. Most clients with an infection were routed to PV (92%) rather than ET (8%; $P < 0.001$). Among those who tested positive for chlamydia or gonorrhea, clients routed to PV were less likely to have chlamydia (78%) compared with clients routed to ET (92%; $P < 0.001$) and clients routed to PV were more likely to have gonorrhea (15%) than clients routed to ET (5%; $P < 0.001$; Table 2).

Treatment by Group

A higher percentage of PV clients (98.8%) received treatment as compared with clients seen in ET (94.3%; $P < 0.001$). Among patients diagnosed through PV, 98.4% received treatment within 30 days as compared with 92.6% of patients who were diagnosed through ET ($P < 0.001$). Among chlamydia and gonorrhea cases diagnosed through PV 85.2% were treated the day they were tested (Table 2).

Personnel Cost Savings

Cost comparison was performed by calculating the staff costs of questionnaire screening of 1000 patients and routing 20% (200) to ET compared with the staff cost of these 200 patients being seen through PV. The staff costs of routing 200 of 1000 patients to ET include \$210 for review of the questionnaire for all 1000 patients plus the staff cost to collect specimens in 200 patients ($200 \text{ patients} \times \$2.60/\text{patient} = \$520$) totaling \$730. The staff cost for 200 patients to be seen through PV was \$3666 ($200 \text{ patients} \times \$18.33/\text{patient}$).

The cost savings associated with using of ET for 20% of the patients seen at the STD clinic was \$2936 per 1000 clients (\$3666–\$730). The estimated annual staff-only cost savings of offering ET to only 20% of the patients seeking testing services in the MCDPH STD clinic, using an estimated 20,000 clients tested/year, was \$58,000.

Client Services

Client turn-aways decreased from 159 clients during the 2 months before implementation of ET (July 2008 through August 2008) to 6 clients during the last 2 months of evaluation (June 2011 through July 2011), a 96% reduction. The number of patient visits at MCDPH increased from 18,555 in 2008 to 19,682 in 2011 (6% increase). An overall increase in cases identified at MCDPH clinic occurred, with 2130 chlamydia and gonorrhea cases detected in 2008, as compared with 3450 cases in 2011 (62% increase).

DISCUSSION

The Maricopa County STD clinic is a high-volume STD testing, diagnosis, and treatment facility that provides services to a predominantly male clientele. This study demonstrates that the method of patient-intake screening appropriately routed asymptomatic, lower-risk patients for ET. Treatment completion rates were high among positive clients in both groups. Chlamydia accounted for a higher percentage of infections identified through ET than PV, demonstrating the asymptomatic nature of this infection. Cost savings were demonstrated with the implementation of ET, and client turn-aways were reduced. In this STD clinical

setting, the implementation of ET improved client access to testing while maintaining a high treatment completion rate.

Based on comparisons of test positivity, the triage method used by the MCDPH was effective in routing high-risk clients to PVs. Most patients who tested positive through a PV received same-day treatment. Budgeting the time of a clinician to provide services to a population for whom an evaluation is important, while maintaining a low-cost screening option for asymptomatic patients, may be an option to preserve these services in areas experiencing financial constraints and high STD morbidity. A survey done by the National Coalition of STD Directors found that 69% of STD programs experienced budget cuts in 2008, and the number of categorical STD clinics in the United States declined by 10% over the last decade.^{10,11} Efforts to preserve STD services in jurisdictions facing resource constraints might include the application of asymptomatic laboratory-only screening options as a way to prioritize higher-risk populations for provider evaluation.

The higher treatment completion percentage in our PV group reflects same-day treatment for clients with symptoms, those that were contacts to a diagnosed case, or those with other risk factors. Published results from a Denver ET model found that the treatment completion rate was higher among the ET group (81.9% for women and 80.4% for men) compared with the PV group (69.3% for women and 67.1% for men).² Differences in treatment outcomes in comparison with our results may reflect varying practices regarding presumptive treatment and patient follow-up. These results demonstrate an effective screening method, whereby high-risk patients are routed to PVs where presumptive treatment is available. Time to treatment was somewhat longer for ET clients compared with those tested through PV and may be caused by delays in ET patients calling back for test results as well as follow-up for treatment. Delays in treatment for patients with STDs diagnosed in STD and non-STD settings have been demonstrated in other areas and reflect challenges in patient notification of results, field follow-up, and treatment referral.^{3,12,13} During 2013, MCDPH hopes to improve access to testing results through a Web-based patient accessible medical record, which may result in improved time to treatment and treatment completion rates among ET clients.

Sexually transmitted diseases impose a significant cost burden on the medical system in the United States.¹⁴ Staff cost savings associated with the use of ET versus PV in this study was \$2936 per 1000 clients, with only 20% of the clients being routed through ET. Additional staff time savings allowed MCDPH to reassign 1 medical provider staff to another clinical services area within the department. The expanded implementation of ET at MCDPH has provided a model by which public health testing services can be offered to more persons at risk for STDs at a lower cost compared with prior testing methods. Efforts to achieve appropriate scale of this program, while maximizing cost-savings and maintaining high treatment rates, will require ongoing evaluation of triage methods. The cost savings afforded by implementation and expansion of ET will be used to preserve STD screening within the MCDPH system.

Fewer patients were turned away for services after the implementation of ET. Based on analyses in this study and to provide testing services to a larger population, MCDPH has

now implemented an in-person intake screening system to increase the number of clients routed through ET. This has resulted in greater numbers of persons receiving testing through ET and decreased wait times for PVs. The MCDPH ET program is able to provide STD testing to 5 or more clients per hour as compared with the PV, which typically allows for 3 patients per hour per provider. With the implementation of ET, MCDPH has been able to expand testing to a larger population seeking STD services.

There are limitations to the method used to identify patients for ET. First, clients may not have disclosed STD symptoms when completing their initial questionnaires and thus could have been inappropriately routed through ET. Second, some asymptomatic clients would have been allowed to see a medical provider for reassurance if they did not feel comfortable with an ET visit. Third, the questionnaire may not have provided reliable data from which to route patients to ET versus a PV due to misinterpretation, language, or literacy barriers. Limitations to the use and interpretation of these data should also be considered. For the purposes of program improvement, these data focused on the 2 most commonly diagnosed STDs (gonorrhea and chlamydia). Syphilis and HIV results were not included because of differing treatment referral practices that require long-term follow-up. We did not perform a comprehensive cost-effectiveness analysis in which all relevant costs and benefits of ET and PV were included. Instead, we focused on the savings in personnel costs that could be achieved by incorporating ET into an existing STD program. In addition, we assumed that the need to return for treatment would have been the same for ET patients if they had instead had a PV; staff costs for these return visits were not included. Untreated cases were routed to field services for treatment and follow-up. This staff time was not included in the cost analysis.

Express testing has been shown to increase clinic efficiency and capacity, deliver screening tests to asymptomatic patients, expand clients' access to drop in STD/HIV services, and decrease patient turn-away numbers.¹⁻⁴ In accordance with other studies, we found similar results and a cost benefit of providing ET as an alternative to PVs for some clients. Rising STD rates, the need for low-cost STD services (for both patients and health organizations), and the asymptomatic nature of these infections highlight the need for efficient screening and treatment opportunities, particularly among men who lack a gender-based clinical subspecialty dedicated to their health care needs.¹⁰ Sexually transmitted disease clinics offer low-cost testing options for clients who are uninsured or who do not wish to seek STD care that will be reported to their insurance company.^{4,10} Owing to budget shortfalls in state and local health departments, STD clinic closures have increased.¹⁰ Numerous STD clinics, both domestic and abroad, have evaluated triage-based STD testing without a provider evaluation and have demonstrated that these approaches can result in significant improvements in clinic efficiency and reduction of patient waiting time.¹⁻⁴ Because STD/HIV programs anticipate further declines in resources, cost-saving activities that maintain and improve screening and treatment services, such as express STD/HIV testing methods, are essential.

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TABLE 1.

Total Clients Tested and Clients With a Positive Chlamydia or Gonorrhea Test Result Among Patients Routed to PVs or ET Visits: Maricopa County, September 2008–July 2011

	Tested (n = 36,946), % of Row Total		Positive (n = 6850), % of Those Tested	
	Provider (n = 29,480)	% [*]	Express (n = 7466)	% [*]
Sex				
Male	17,972	78.8	4841	21.2
Female	11,453	81.4	2613	18.6
Unknown	55	82.1	12	17.9
Total	29,480	79.8	7466	20.2
Race/Ethnicity				
American Indian	430	86.0	70	14.0
Asian	412	70.9	169	29.1
African American	5150	83.1	1048	16.9
White	9031	72.2	3483	27.8
Hispanic	13,427	84.4	2477	15.6
Unknown	1030	82.5	219	17.5
Age, y				
<14	50	87.7	7	12.3
15–19	3213	85.7	535	14.3
20–24	8237	79.8	2079	20.2
25–29	6240	79.0	1658	21.0
30–34	4002	78.8	1077	21.2
35–39	2712	80.7	650	19.3
40–44	1934	79.4	502	20.6
45–49	1358	79.7	346	20.3
50–54	860	77.0	257	23.0
>55	874	71.1	355	28.9

* Row percent.

TABLE 2.

Chlamydia and Gonorrhea Infections Diagnosed and Treatment Completion by Visit Type, Maricopa County, September 2008–July 2011

	PV (n = 6323), n (%)	ET (n = 527), n (%)	P*
Diagnosis			<0.001
Chlamydia only	4915 (77.7)	487 (92.4)	
Gonorrhea only	942 (14.9)	24 (4.6)	
Coinfection	466 (7.4)	16 (3.0)	
Treatment			<0.001
Treated	6249 (98.8)	497 (94.3)	
Untreated	74 (1.2)	30 (5.7)	
Time to treatment (d)			<0.001
1	5387 (85.2)	6 (1.1)	
2–7	402 (6.4)	239 (45.4)	
8–14	303 (4.8)	172 (32.6)	
15–30	130 (2.1)	71 (13.5)	
>30–90	27 (0.4)	9 (1.7)	

* Pvalue comparing PV versus ET.