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Effectiveness of a universally offered Chlamydia and gonorrhea screening intervention in the pediatric emergency department

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Abstract

Purpose: Adolescents represent over half of the newly diagnosed sexually transmitted infections in the US annually. Emergency departments (ED) may serve as an effective, nontraditional setting to screen for Chlamydia/gonorrhea (CT/GC). The objective was to evaluate the effectiveness of a universally offered CT/GC screening program in two pediatric ED settings.

Methods: This was a prospective, delayed start pragmatic study conducted over 18 months in two EDs within the same academic institution among ED adolescents ages 14-21 years with any chief complaint. Using a tablet device, adolescents were confidentially informed of CT/GC screening recommendations and were offered screening. If patients agreed to CT/GC testing, a

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clinical decision support tool was triggered to inform the provider and order testing. The main and key secondary outcomes were the proportion of CT/GC testing and positive CT/GC test results in each respective ED.

Results: Both EDs experienced modest but statistically significant increases in CT/GC testing post- vs. pre- intervention (main: 11.5% vs. 7.9%; CI: 2.9, 4.2; $p < 0.0001$ and satellite: 3.8% vs. 2.6%; 95% CI: 0.7, 1.7; $p < 0.0001$). Among those tested, the positivity rate at the main ED did not significantly change post- vs. pre-intervention (24.1% vs. 23.2%, 95% CI: −1.9, 3.8; p=0.71) but significantly decreased at the satellite ED (7.6% vs. 14.8%, 95% CI: −12.2, −2.2; p=0.01).

Conclusion: A universally offered screening intervention increased the proportion of adolescents who were tested at both EDs and the detection rates for CT/GC at the main ED, but patient acceptance of screening was low.

Keywords

adolescents; sexually transmitted infections; gonorrhea; Chlamydia; screening; emergency department

Adolescents and young adults comprise approximately one quarter of the sexually active population but represent over half of the newly diagnosed sexually transmitted infections (STI) in the United States annually [1]. Interventions to screen and treat chlamydia (CT) and gonorrhea (GC) in adolescents are needed to contain the STI epidemic and decrease the associated morbidity and healthcare costs [2–4].

Screening patients < 25 years of age for CT/GC is one of the most cost-effective preventive services, but screening opportunities for adolescents are underutilized [5–12]. Adolescents are difficult to reach because a large proportion lack a medical home. This may be a key reason for screening underutilization among this population [13]. The United States Preventive Services Task Force has suggested that the ED may serve as an effective, nontraditional setting in which to screen high risk adolescents for CT/GC [14–18]. Expert consensus indicates that research addressing the effectiveness, sustainability and integration of innovative STI screening programs in the ED is warranted [19–22].

Preliminary findings in research settings demonstrate that ED universal CT/GC screening is feasible and effective among adult and some adolescent populations [23–29]. School based and pediatric ED screening programs have demonstrated feasibility using an age-based approach similar to the HIV screening approach recommended by the Centers for Disease Control and Prevention (CDC) [25, 30–32]. However, it is unknown whether these research findings can be translated effectively into routine clinical practice. This study evaluated the effectiveness of a universally offered CT/GC screening program in two pediatric ED settings.

Methods

Study Design and Setting

This was a prospective, delayed start pragmatic study. CT/GC testing rates at both sites were measured for 12 months before the implementation of a CT/GC screening intervention [33, 34]. The intervention design and implementation are described elsewhere [35].

This study was conducted in two EDs both affiliated with the same pediatric academic facility. The main ED is an urban, tertiary care, level 1 trauma center with over 62,000 annual visits; patients are 41% black, 56% white, 2.8% Hispanic, 52% government insured and 41% privately insured. Patients ages 14-21 years comprise approximately 25% of those visits. The second is a satellite ED located in a northern, suburban area. This ED has over 36,000 annual visits; patients are 15% black, 78% white, 6.8% Hispanic, 35% government insured and 62% privately insured. Patients ages 14-21 years comprise approximately 20% of visits. The same healthcare providers staff both EDs.

This CT/GC screening intervention was implemented at the main ED initially while the satellite ED served as a concurrent control site for six months after which the intervention was also implemented at the satellite EDBoth sites continued for one full year to account for seasonal trends.

Selection of Participants

The eligible population included all adolescents ages 14-21 years who visited the ED with any chief complaint. It was standard workflow to register each patient in their private room, therefore, registration staff were assigned to administer the tablet to all adolescents aged 14-21 years [35]. On the tablet device, staff documented patients who did not receive the screening intervention because they were triaged as critical, severely developmentally delayed, unable to understand English or otherwise unable to provide medical consent. Healthcare providers were educated regarding the purpose and planned execution of the screening program. Because an age-based approach had been previously shown to be feasible in an ED setting, and adolescents are often not willing to admit to sexual experience, we offered screening to all adolescents ages 14-21 years regardless of reported sexual activity [36]. This approach was consistent with the CDC recommendations for age-based HIV screening [30]. Providers still tested patients outside of the intervention as clinically indicated. This intervention was intended to augment testing among patients who may not have otherwise been offered testing.

Interventions

On the tablet device, adolescents were confidentially informed that CT/GC screening was recommended for all sexually active adolescents, and each was offered screening by the registration staff at the time of registration per a scripted, standardized approach. If the patient declined, a reason was recorded [35]. If the patient agreed to participate, a clinical decision support (CDS) tool was triggered to inform the provider and display a link to order testing. A urine sample was collected, and CT/GC nucleic acid amplification testing was performed in the hospital laboratory. The ED and the health department were notified of all positive test results as is standard practice. A designated post-visit ED nurse contacted all patients with positive test results, assuring treatment was arranged. This study was reviewed and approved by the hospital's institutional review board.

Main Outcome Measures

The primary outcome measure was the proportion of patients tested for CT/GC pre- versus post- screening implementation at each respective ED. The key secondary outcome was the proportion positive for CT, GC or both among tested subjects pre- and post- intervention. Additional secondary outcomes included the: 1) proportion of symptomatic and asymptomatic patients tested for CT/GC pre- and post- intervention, 2) ED length-of-stay pre- and post- intervention, and 3) among those consenting to testing on the tablet, the proportion appropriately treated ≤ 14 days from testing post-intervention. Patients who were tested in the ED for CT/GC as part of their diagnostic evaluation were included in the pre- and post- implementation statistics as they provide a baseline number of patients tested prior to the intervention.

Statistical Analyses

The objectives of the analyses were to assess the effect of CT/GC screening intervention in the pediatric ED setting as measured by the primary and secondary outcomes. In addition to analyzing each ED independently, we also 1) compared demographics of patients tested for CT/GC at both EDs during the 12-month pre-intervention period and 2) compared the pre- and post- outcomes observed at the main ED with the difference observed at the satellite ED.

We expected that among all ED patients at both sites, the pre-intervention rate of asymptomatic patients tested for CT/GC would be near zero, whereas the baseline proportion of those tested who were symptomatic, determined by chief complaint, would vary by ED as a function of differences in the distribution of patients by race/ethnicity, gender, age and insurance status [11, 37]. We used descriptive statistics, frequency distributions and nonparametric techniques to document these baseline patterns and compare EDs. Chi-square tests were used to test the outcome difference between pre- and post-intervention within baseline demographics stratum.

To assess the influence of covariates on testing while accounting for the presence of the screening intervention (main independent variable), a logistic regression (LR) analysis was performed with the dependent variable of whether the patient was tested for CT/GC. Among those tested, similar analyses were completed to assess the dependent variable of whether patients were positive for CT/GC.

To explore whether the intervention effect differed by ED site, an LR model of screening status, including terms for patient demographics and ED site, provided an estimate of the site differential adjusted by race/ethnicity, gender, age and insurance status. All statistical analyses were conducted using SAS version 9.4 (SAS Institute, Cary, NC).

RESULTS

Pre-Intervention Testing and Positivity Rates

Prior to the intervention, 7.9% of patients ages 14-21 years were tested at the main ED and 2.6% at the satellite ED as reported previously [35]. The main ED had a higher baseline positivity rate (23.2%) than the satellite ED (14.8%).

Post-Intervention Testing Rates

Main ED—Among all patients ages 14-21 years in the main ED, the percentage of CT/GC testing significantly increased post- vs. pre-intervention (11.5% vs. 7.9%; 95% CI: 2.9, 4.2; p < 0.0001) as compared to baseline rates. Among those tested, the percentage of asymptomatic patients significantly increased post intervention (29.4% vs. 9.6%, 95% CI: 17.3, 22.4; p<.0001) compared to baseline rates. There were no differences in ED length of stay pre- vs. post-intervention.

As previously reported, between May 2016 and May 2017, 15,252 patients ages 14-21 years visited the Main ED. Of these, 9,854 (64.6%) had tablet data recorded (either data completed by the adolescent or refusal reasons entered by registration staff) and 979 (9.9%) of them agreed to CT/GC testing [35] (Figure 1).

As per Figure 1, of the 979 patients who consented to testing on the tablet, 743 (76%) were tested for CT/GC. 230 (31%) of these patients already had CT/GC testing ordered as part of their clinical care before the patient agreed to screening on the tablet. Therefore, a CDS tool was not triggered because the testing had already been ordered. For the majority of the 45 patients for whom the CDS did not fire and a CT/GC test was not ordered, the registration and consent process occurred after the patient had been discharged from the ED. Therefore, there wasn't an opportunity for clinicians to interact with the medical record. The remaining 513 (69%) patients were tested due to the intervention (the CDS triggered because the patient agreed to CT/GC testing via the tablet). Among the 513 patients tested, 99 tested positive of whom 27 were asymptomatic. When the CDS was not triggered and a test was ordered (n= 230 patients), there were 74 positive patients of whom 5 were asymptomatic. Overall, among those who consented to testing on the tablet, 173 (23.3%) were positive for GC, CT or both and 156 (90%) had appropriate treatment documented within 14 days of testing (141 treated ≤ 7 days, 15 treated between 8-14 days, 1 treated >14 days and 16 with undocumented treatment).

Among these who consented to testing, patient gender, ethnicity or insurance status were not significantly associated with whether they were tested. However, age (p=0.005) and race (p<.001) were significantly associated with testing. Among patients who consented to testing, older age (14-15 years: 34.8%; 16-17 years: 30%; and 18-21 years: 21.7%) and Black race compared to White (20.9% vs. 39.5%) were both associated with a lower rate of testing.

Satellite ED—Among all patients ages 14-21 years in the satellite ED, CT/GC testing rates significantly increased post- vs. pre-intervention (3.8% vs. 2.6%; 95% CI: 0.7, 1.7; p < 0.0001). Among those tested, the percentage of asymptomatic patients post-intervention was significantly higher than pre-intervention (48.1% vs. 5.8%; 95% CI: 36.1, 48.2; p<.0001). ED length of stay post intervention was significantly longer (211.2 vs. 204.3 minutes; p<0.0001).

As previously reported, between December 2016 and December 2017, 7003 patients ages 14-21 years visited the satellite pediatric ED. Of these, 4516 (64.5%) had tablet data recorded, and 200 (4.4%) of them agreed to CT/GC testing [35] (Figure 2).

Among those who consented for testing on the tablet, 134 (67%) patients were tested for CT/GC. Similar to the main ED, 45 (33.5%) of these patients already had CT/GC testing ordered as part of their clinical care, and a CDS tool was not triggered. The CDS did not fire and a CT/GC test was not ordered for 31 patients, for the same reasons as described above in the main ED. The remaining 89 (66.9%) patients were tested due to the intervention. Among patients who consented to testing on the tablet and had a test ordered, seven (5.2%) were positive for GC, CT or both and 6 (85.7%) had appropriate treatment documented within 14 days of testing (5 treated ≤ 7 days, 1 treated between 8-14 days and 1 with undocumented treatment).

Effect of the intervention and other factors on the proportion of patients tested for CT/GC

Main ED—A significantly higher proportion of patients were tested post-intervention compared to pre-intervention, across all baseline demographics except for the Hispanic stratum. The difference in proportion of screening post- versus pre-intervention significantly increased with age (p = 0.02). (Table 1)

An LR model of the screening status on intervention with adjustment of race, ethnicity, gender, insurance and age identified that post-intervention, Black patients were more likely to be tested as compared to white patients as were older adolescents, females, those with self-pay/other insurance and non-Hispanic patients (Table 2). LR analyses examining trend within the study time-period showed no significant time trends that could influence the intervention effect.

Satellite ED—Similar to the main ED, the proportion of screening post-intervention was significantly higher compared to pre-intervention among almost all baseline demographics except Black race, self-pay/other insurance, and the Hispanic strata (Table 1). LR of the screening status by intervention with adjustment of race, ethnicity, gender, insurance and age indicated that older age, black race, those with self-pay/other insurance and female gender were associated with increased odds of testing post intervention (Table 2).

Effect of the intervention and other factors on the proportion positive for CT and/or GC among patients tested

Main ED—Among those who were tested, the percent of patients with a positive test was only significantly different among race (other) and gender. The rate of a positive test was significantly higher among females post-intervention (Table 1).

In an LR analysis of positivity status by intervention (adjusting for age, race, gender, insurance and ethnicity), among those who were tested for CT/GC at the main ED, mid-age

(16-17), Black race, male gender and those with self-pay/other insurance were associated with increased odds of a positive test. The positivity rate did not significantly change post-intervention (Table 3).

Satellite ED—Post-intervention, the positivity rate significantly decreased among patients who were 14-15 years old, with government insurance or self-pay/other, those of either gender, those of other race and of non-Hispanic origin (Table 1). LR analysis was not possible within this site due to small numbers of positive patients at the satellite ED.

When adjusting for age, race, gender, insurance and ethnicity, LR analysis of screening status showed no significant interaction between intervention and ED site ($p = 0.45$).

Discussion

This study showed that a universally offered CT/GC screening intervention increased CT/GC testing at two pediatric EDs. Although the absolute percent change was small, it resulted in >500 additional patients tested for CT/GC at the main ED with almost 100 positive tests and >80 additional patients tested at the satellite ED with 4 additional positive tests. Pre-intervention testing at both sites mostly included patients who were symptomatic; therefore, this increase in testing likely represents presumed asymptomatic patients who would not have been tested during routine ED care. This intervention was implemented within the workflow of the ED and did not increase the length of stay at the main ED; there was a statistically significant difference in length of stay at the satellite ED, but it was only seven minutes and not clinically significant.

There was a decrease post- vs. pre-intervention in the proportion of participants who tested positive for CT and/or GC at the satellite ED, which is expected as screening was offered to asymptomatic patients. However, the high positivity rates seen at the main ED prior to implementation remained the same even as the number of patients screened significantly increased. It is possible that patients who were at high risk and subsequently tested positive self-selected into the testing group at the main ED, whose catchment area covers a higher-risk population. Therefore, there was a benefit of identifying more positive patients with minimal increase in overall patient testing. The advantage to the universally offered method in contrast to a targeted method is that patients did not have to complete lengthy sexual history surveys in which they may not always be truthful regarding their risk factors and sexual activity, or may not complete due to the length of the survey [29, 38]. Universally offered testing allowed each patient to confidentially self-select into testing using one electronic screening question.

Among patients with positive test results, there was a significant difference in the intervention effect between the two EDs, demonstrated by significantly lower positivity rates post- intervention at the satellite ED but not at the main ED. This may be secondary to epidemiologic differences at the two sites and baseline differences in the number of patients routinely seeking STI care at each site, leading to a greater acceptance of screening opportunities at the main ED [35, 39].

Because our results demonstrate that this screening intervention identified an increased number of infected asymptomatic patients at the main ED, it is possible that these patients may not have been screened and would have remained untreated, leading to further transmission of infection and long-term consequences, including pelvic inflammatory disease and infertility. It is also possible that without the screening intervention, some symptomatic patients would not have disclosed their symptoms (e.g. those who presented to the ED with a different chief complaint), and therefore would not have been tested, making the potential impact of the intervention even greater. In contrast, the satellite ED had a very small proportion of positive patients, suggesting that universally offered screening may be most beneficial at sites with higher rates of STIs.

Since the CT/GC results were not available during the ED visit, adolescents often were not treated at the time of the visit and required follow up. Despite this challenge, we were able to assure at least 90% of patients received appropriate treatment within 14 days of their ED visit per chart documentation and direct patient contact. This is similar to data reported among pediatric EDs implementing targeted screening interventions, but vastly better than most of the follow up treatment rates published in the literature [29, 38, 40]. This high rate of treatment was likely due to the fact that the CDS also included an order for nursing to collect a confidential phone number directly from the patient used only for test result follow up [41].

Because this was a pragmatic study, the clinicians ultimately had the choice of whether to order CT/GC testing for each patient despite the CDS prompt indicating that a patient requested testing. Among those who consented to testing and triggered the CDS, 27% and 28% at the main and satellite ED respectively, were not tested. This suggests provider bias considering the proportions not tested were almost equal between sites, and both sites were staffed by the same providers. This also could be a result of the lack of awareness of the intervention as there are many residents rotating through the ED who may have opted not to order testing if the patient wasn't presenting with that specific complaint. If these patients were indeed tested, identification of positive patients may have been greater. Not ordering testing for which the patient agreed further contributes to these missed opportunities for screening especially among patients who are likely high risk. This may indirectly influence adolescent's acceptance of screening opportunities in the future. Additionally, among those who consented to testing, white race and older age were associated with lower rates of testing which is consistent with STI testing disparities identified in the literature [12, 37]. To promote improved engagement with the CDS and test ordering, individual provider performance feedback could be implemented as it has been shown to be successful in prior studies implementing CDS tools [42]. Other opportunities for improving compliance include increased education for providers, assuring patients are consented early in the ED visit (e.g. triage) to guarantee that the provider interacts with the chart and the CDS, and requiring providers (rather than making it optional) to document the reason for not ordering testing.

There are several limitations to this study. First, despite having two sites that are part of the same institution, they are different patient populations and demographics possibly limiting the generalizability of the findings. There was extensive informational technology support to build this electronic health record intervention (EHR) which may not be easily replicated at sites with different EHRs or minimal information technology support. Although the study included information regarding patient treatment, we did not pursue interventions to assure partner testing and treatment among positive patients. This also was a pragmatic study with the goal of integrating the process into ED workflow. It was not a trial with enrollment goals driven by a power analysis. However, the results reflect real world process implementation allowing for increased understanding of the translation of research processes into clinical care. Additionally, we identified symptomatic patients based on their chief complaint. Many patients may not report symptoms nor their real chief complaint therefore, we may be over estimating the numbers of asymptomatic patients. Finally, due to funding limitations, we excluded those who did not understand English which eliminated a small, but important subset of our population [35].

A universally offered screening intervention that was integrated into the EHR significantly increased the proportion of 14-21 year-old adolescents who were tested for CT/GC and increased the detection rates of CT/GC infection at the main ED, but the patient acceptance of screening was low. Evaluating the cost effectiveness of this screening intervention and methods to increase patient acceptability will be important to improve the effectiveness of this intervention and increase CT/GC testing in an ED setting. A multicenter clinical effectiveness trial would increase the generalizability of this screening intervention.

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List of Abbreviations:

GC	Gonorrhea
CT	Chlamydia
STIs	Sexually Transmitted Infections
ED	Emergency Department
CDS	Clinical Decision Support
EHR	Electronic Health Records
CI	Confidence Interval
CDC	Centers for Disease Control and Prevention
LR	Logistic Regression

OR	Odds Ratio

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Implications and Contributions

At two emergency departments, Chlamydia/gonorrhea testing significantly increased after a universally offered screening program was implemented, but patient acceptance of screening was low. The positivity rate at the main emergency department did not significantly change post-intervention suggesting that high risk patients self-select into Chlamydia/gonorrhea screening even if asymptomatic.

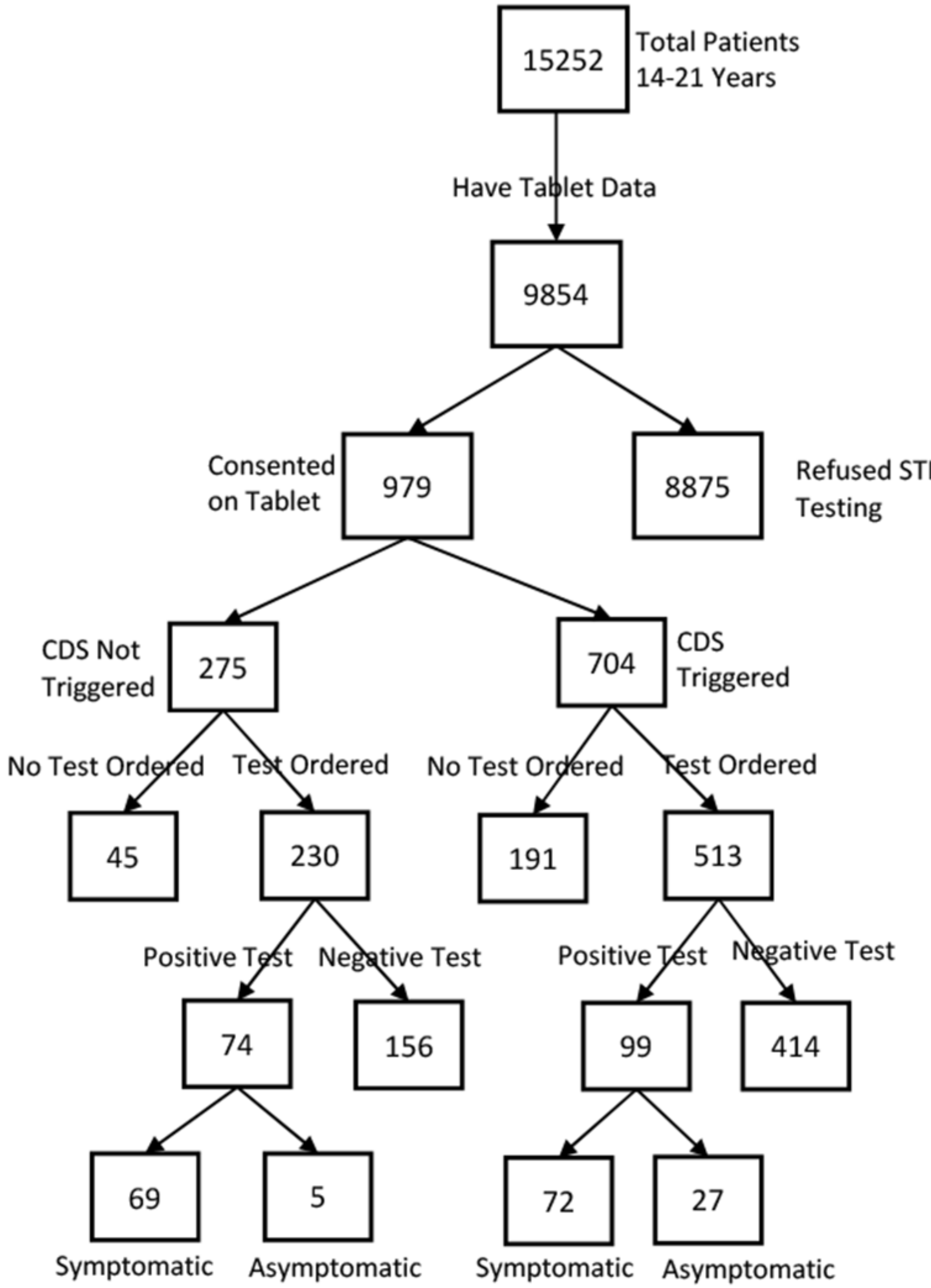

Figure 1:
Flow chart of main ED patients with recorded tablet data[34]

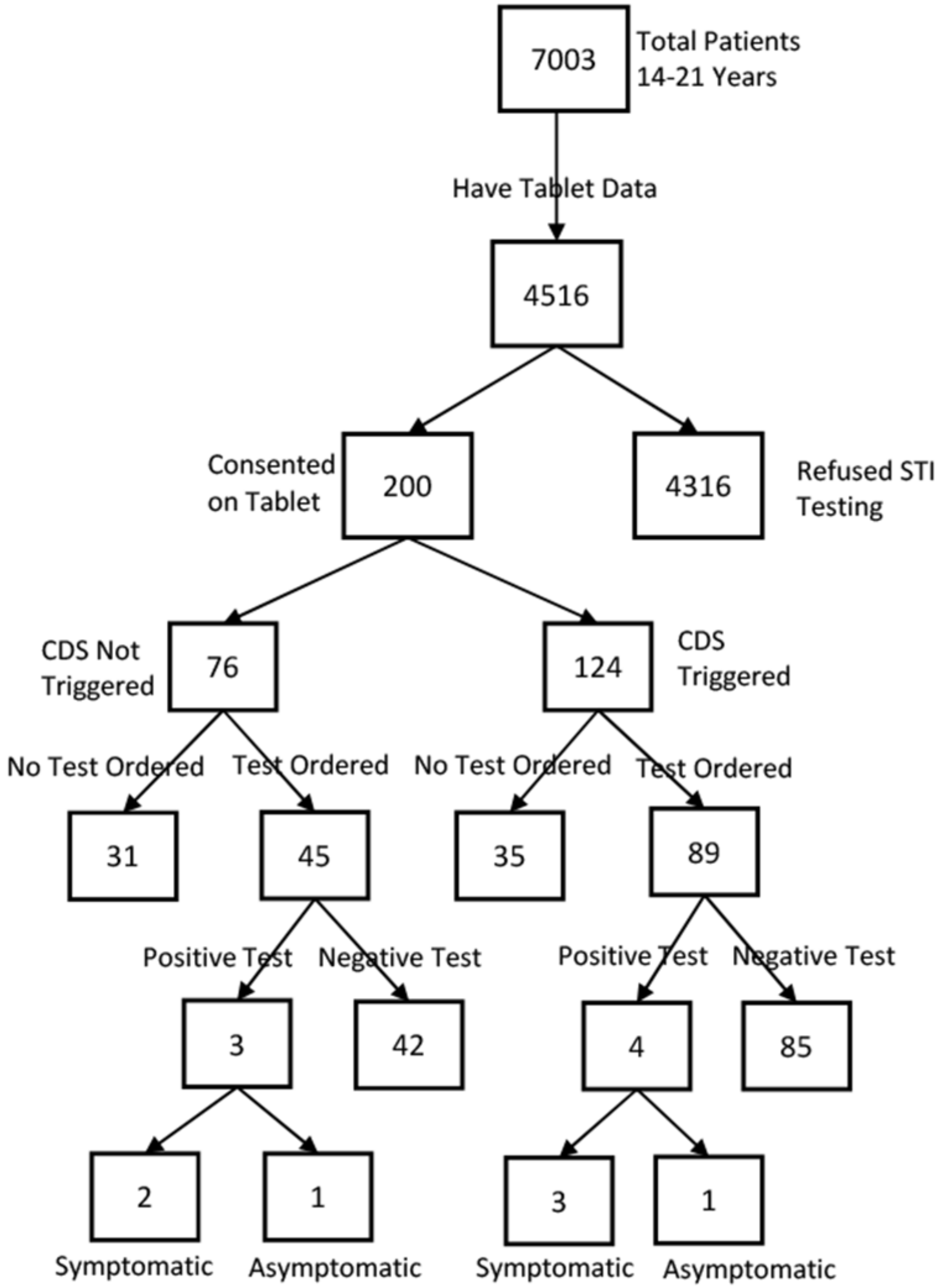

Figure 2:
Flow chart of satellite ED patients with recorded tablet data[34]

Table 1:

Demographics of all patients tested and all patients testing positive pre- and post- Chlamydia/gonorrhea screening intervention at the main and satellite EDs

Patients Tested for Chlamydia/gonorrhea								
	MAIN ED				SATELLITE ED			
	Pre-interv N =21,229 N (%)	**Post-interv N=15,252 N (%)**	**p-value[a]**	**p-value[b]**	**Pre-interv N=13,342 N (%)**	**Post- interv N=7003 N (%)**	**p-value[a]**	**p-value[b]**
Age								
14-15	225/8190 (2.7)	308/5884 (5.2)	<.01		75/6172 (1.2)	58/3103 (1.9)	0.01	
16-17	649/8184 (7.9)	619/5909 (10.5)	<.01	0.02	189/5508 (3.4)	138/2977 (4.6)	<.01	0.71
18-21	774/4925 (15.7)	823/3459 (23.8)	<.01		79/1662 (4.8)	68/923 (7.4)	<.01	
Race								
Black	1203/8761 (13.7)	1244/5915 (21.0)	<.01		79/1755 (4.5)	47/928 (5.1)	0.51	
White	378/10935 (3.5)	389/8041 (4.8)	<.01	0.16	237/10327 (2.3)	188/5328 (3.5)	<.01	0.23
Other	94/1567 (6.0)	117/1265 (9.2)	<.01		27/1248 (2.2)	29/737 (3.9)	0.02	
Insurance								
Govern	1181/11893 (9.9)	1165/8004 (14.6)	<.01		168/4768 (3.5)	116/2509 (4.6)	0.02	
Private	299/8263 (3.6)	282/5930 (4.8)	<.01	0.29	153/8103 (1.9)	123/4079 (3.0)	<.01	0.52
Self Pay or Other	195/1079 (18.1)	300/1226 (24.5)	<.01		19/389 (4.9)	24/365 (6.6)	0.32	
Gender								
Female	1331/13102 (10.2)	1333/9240 (14.4)	<.01	0.15	287/7996 (3.6)	203/4076 (5.0)	<.01	0.09
Male	347/8197 (4.2)	417/6010 (6.9)	<.01		56/5346 (1.1)	61/2925 (2.1)	<.01	
Ethnicity								
Hispanic	22/472 (4.66)	23/355 (6.48)	0.25	0.84	16/674 (2.4)	18/432 (4.2)	0.09	0.59
Non-Hispanic	1649/20651 (8.0)	1712/14776 (11.6)	<.01		326/12614 (2.6)	246/6539 (3.8)	<.01	
Patients Testing Positive for Chlamydia/gonorrhea								
	MAIN ED				SATELLITE ED			
	Pre-interv N =1678 N (%)	**Post-interv N=1750 N (%)**	**p-value[a]**	**p-value[b]**	**Pre-interv N=343 N (%)**	**Post-interv N=264 N (%)**	**p-value[a]**	**p-value[b]**
Age								
14-15	48/255 (18.8)	57/308 (18.5)	0.92		12/75 (16.0)	1/58 (1.7)	<.01	
16-17	167/649 (25.7)	171/619 (27.6)	0.45	0.89	25/189 (13.2)	11/138 (8.0)	0.13	0.24
18-21	175/774 (22.6)	194/823 (23.6)	0.65		14/79 (17.7)	8/68 (11.8)	0.31	
Race					**Race**			
Black	338/1203 (28.1)	354/1244 (28.5)	0.84	0.13	21/79 (26.6)	6/47 (12.8)	0.07	0.32
White	38/378 (10.1)	38/389 (9.8)	0.90		22/237 (9.3)	12/188 (6.4)	0.27	

Patients Tested for Chlamydia/gonorrhea								
	MAIN ED				**SATELLITE ED**			
	Pre-interv N =21,229 N (%)	**Post-interv N=15,252 N (%)**	**p-value[a]**	**p-value [b]**	**Pre-interv N=13,342 N (%)**	**Post- interv N=7003 N (%)**	**p-value[a]**	**p-value[b]**
Other	13/94 (13.8)	30/117 (25.6)	0.03		8/27 (29.6)	2/29 (6.9)	0.03	
Insurance					**Insurance**			
Govern	288/1181 (24.4)	288/1165 (24.7)	0.85	0.73	28/168 (16.7)	7/116 (6.0)	<.01	0.16
Private	36/299 (12.0)	39/282 (13.8)	0.52		15/153 (9.8)	10/123 (8.1)	0.63	
Self Pay or Other	65/195 (33.3)	94/300 (31.3)	0.64		8/19 (42.1)	3/24 (12.5)	0.03	
Gender					**Gender**			
Female	267/1331 (20.1)	310/1333 (23.3)	0.04	<0.01	42/287 (14.6)	17/203 (8.4)	0.04	0.37
Male	123/347 (35.4)	112/417 (26.9)	0.01		9/56 (16.1)	3/61 (4.9)	0.04	
Ethnicity					**Ethnicity**			
Hispanic	1/22 (4.5)	4/23 (17.4)	0.17	0.21	3/16 (18.8)	1/18 (5.6)	0.23	0.61
Non-Hispanic	388/1649 (23.5)	411/1712 (24.0)	0.75		48/326 (14.7)	19/246 (7.7)	0.01	

[a] p-value based on Chi-square tests for each categories of the demographic variables, testing the null hypothesis of no association between intervention (pre- vs. post-) and the screening status.

[b] p-value based on interaction term of the demographic variable with the intervention in logistic regression model of screening status

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Table 2:

Logistic regression of all patients tested for Chlamydia/gonorrhea at the main and satellite EDs

	MAIN ED				SATELLITE ED			
	Unadjusted OR (95% CI)	**P value**	**Adjusted OR (95% CI)**	**P value**	**Unadjusted OR (95% CI)**	**P value**	**Adjusted OR (95% CI)**	**P value**
Intervention								
Pre-	Ref	<.0001	Ref	<.0001	Ref	<.0001	Ref	<.0001
Post-	1.52 (1.41, 1.63)		1.60 (1.48, 1.72)		1.49 (1.26, 1.75)		1.46 (1.24, 1.73)	
Age								
14-15	Ref	<.0001	Ref	<.0001	Ref	<.0001	Ref	<.0001
16-17	2.37 (2.14, 2.63)		2.20 (1.98, 2.44)		2.76 (2.25, 3.38)		2.71 (2.21, 3.33)	
18-21	5.65 (5.11, 6.24)		4.19 (3.77, 4.65)		4.15 (3.27, 5.26)		4.04 (3.17, 5.15)	
Race								
White	Ref	<.0001	Ref	<.0001	Ref	<.0001	Ref	.0004
Black	4.75 (4.37, 5.17)		3.00 (2.73, 3.29)		1.77 (1.44, 2.16)		1.53 (1.24, 1.89)	
Other	1.91 (1.63, 2.34)		1.75 (1.47, 2.09)		1.04 (0.78, 1.38)		1.02 (0.73, 1.41)	
Insurance								
Private	Ref	<.0001	Ref	<.0001	Ref	<.0001	Ref	<.0001
Govern	3.13 (2.85, 3.44)		1.84 (1.55, 2.04)		1.75 (1.48, 2.07)		1.74 (1.46, 2.07)	
Self Pay or Other	6.41 (5.53, 7.29)		3.57 (3.18, 4.34)		2.61 (1.88, 3.63)		2.36 (1.67, 3.32)	
Gender								
Male	Ref	<.0001	Ref	<.0001	Ref	<.0001	Ref	<.0001
Female	2.38 (2.19, 2.59)		2.24 (2.05, 2.44)		2.95 (2.41, 3.61)		2.96 (2.41, 3.63)	
Ethnicity								
Hispanic	Ref	0.0001	Ref	0.002	Ref	0.87	Ref	0.96
Non-Hispanic	1.82 (1.35, 2.47)		1.69 (1.21, 2.36)		0.97 (0.68, 1.38)		0.99 (0.65, 1.50)	

Table 3:

Logistic regression of all patients testing positive for Chlamydia/gonorrhea at the main ED

	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)	P value
Intervention				
Pre-	Ref	0.56	Ref	0.80
Post-	1.05 (0.90, 1.23)		1.02 (0.87, 1.20)	
Age				
14-15	Ref	<.001	Ref	0.0001
16-17	1.59 (1.24, 2.03)		1.41 (1.09, 1.82)	
18-21	1.31 (1.03, 1.67)		0.98 (0.76, 1.26)	
Race				
White	Ref	<.0001	Ref	<.0001
Black	3.58 (2.78, 4.61)		3.15 (2.40, 4.15)	
Other	2.33 (1.54, 3.51)		2.15 (1.38, 3.36)	
Insurance				
Private	Ref	<.0001	Ref	<.001
Govern	2.20 (1.69, 2.85)		1.47 (1.12, 1.95)	
Self Pay or Other	3.19 (2.35, 4.34)		1.89 (1.36, 2.62)	
Gender				
Female	Ref	<.0001	Ref	<.0001
Male	1.61 (1.34, 1.92)		1.55 (1.29, 1.86)	
Ethnicity				
Hispanic	Ref	0.05	Ref	0.11
Non-Hispanic	2.50 (0.98, 6.34)		2.24 (0.83, 6.09)	