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Human Immunodeficiency Virus, Chlamydia, and Gonorrhea Testing in New York Medicaid–Enrolled Adolescents

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Abstract

Background: Although growing public health efforts have been expended on increasing adolescents' access to human immunodeficiency virus (HIV) and sexually transmitted infection (STI) testing, little is known about the current utilization of those services in clinical settings.

Methods: Using 2010 to 2012 New York State Center for Medicare and Medicaid Services Medicaid Analytic eXtract data, we estimated the annual percentage of 13- to 19-year-olds who were tested for HIV, chlamydia (CT), and gonorrhea (GC). A regression analysis was performed to identify factors independently associated with testing utilization. We further examined testing utilization in all adolescent females with 1 or more health care encounter, pregnant females, and adolescents at increased risk for HIV/STI.

Results: From 2010 to 2012, HIV, CT, and GC testing rates increased in the overall study population and in most demographic subgroups. Female adolescents, black and Hispanic adolescents, at-risk adolescents, and adolescents with 6 months or longer of enrollment were significantly more likely to be tested. Among adolescent females with 1 or more health care encounter, 19.2% were tested for CT and 16.9% tested for GC in 2012. Among pregnant females, 35.2%, 53.9%, and 46.1% were tested for HIV, CT, and GC, respectively. Among at-risk adolescents, 39.9%, 63.7%, and 54.4% were tested for HIV, CT, and GC, respectively.

Conclusions: Although progress had been made by New York State providers to adhere to recommended testing for adolescents, there was a clear gap between the recommended level of testing and the actual level of utilization among sexually active females, pregnant females, and at-risk adolescents. Opportunities exist for community provider and public health collaboration to increase adolescent HIV and STI testing.

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Many adolescents engage in sexual behaviors that place them at risk for HIV and other sexually transmitted infections (STIs). According to the 2015 National Youth Risk Behavior Survey of high school students aged 14 to 18 years, 41% of students reported having sexual intercourse at least once, 30% reported having sexual intercourse during the previous 3 months, and 12% reported having sex with 4 or more people during their lifetime.[1] Of those sexually active in the previous 3 months, 43% reported not using a condom the last time they had sex. An estimated 8807 youth aged 13 to 24 years were diagnosed with HIV in 2015 in the United States. Twenty percent (1723) of the diagnoses among youth aged 13 to 24 years occurred in persons aged 13 to 19 years.[2] Nearly 20 million new STIs occur every year in this country, half among young people aged 15 to 24 years, and account for almost US $16 billion in direct health care costs.[3]

The prevalence rates of several STIs are highest among adolescents. Fortunately, for nonviral STIs, such as chlamydia (CT) and gonorrhea (GC), treatment can be administered and transmission to others prevented. Although there is currently no cure for HIV, early detection and consistent treatment can decrease viral load which not only increases the life expectancy of those infected but also reduces transmission risk. Thus, providing recommended testing services to adolescents is critical to the prevention and control of HIV and other STIs. Since 2006, the Centers for Disease Control and Prevention has recommended CT and GC screening of all sexually active females under 25 years of age, all pregnant females under 25 years of age, and all sexually active persons with HIV.[4,5] HIV screening is recommended for all pregnant females and all persons who seek evaluation and treatment for STIs.[4–6] The HIV and CT and GC screening is recommended for all sexually active adolescent males who have sex with other males (MSM) at least annually. The American Academy of Pediatrics recommends routine screening for CT and GC in all sexually active female adolescents and young adults (<25 years) annually, sexually active adolescent MSM at least annually, and adolescents and young adults exposed to CT or GC in the past 60 days.[7] The American Academy of Pediatrics also recommends that HIV screening be offered to all adolescents at least once by 16 to 18 years of age in health care settings when the patient population HIV prevalence is more than 0.1%.[8] In areas of lower community HIV prevalence, routine HIV testing is encouraged for all sexually active adolescents and those with other risk factors for HIV (ie, intravenous drug use, exchange sex for money, have multiple sex partners or are MSM). Adolescents tested for other STIs should be tested for HIV at the same visit.[8]

In recent years, growing public health efforts have been expended on increasing adolescents' access to basic sexual health services including HIV and other STI testing.[9,10] However, there is limited knowledge of current adolescent utilization of those testing services in clinical settings. So far, very few studies have examined HIV/STI testing utilization among adolescents.[11–13] To evaluate new public health interventions aimed at increasing HIV/STI testing in adolescents, it is imperative to understand the current state of adolescent testing utilization in clinical settings. Furthermore, to make early detection and treatment of HIV/STIs a reality to every adolescent who is at increased risk, clinician adherence to recommended services is essential. Although guidelines are available for some adolescent subgroups (ie, CT and GC testing of all sexually active adolescent females and HIV, CT, and GC testing of pregnant females), it is important to examine how the recommended services are implemented.

The objective of this study was to conduct a case study of the New York State (NYS) Medicaid-enrolled adolescent population to (1) describe the pattern of recent service utilization of HIV, CT, and GC testing among adolescents, (2) identify factors independently associated with testing utilization, and (3) identify the gaps between the recommended level of testing and actual utilization of services in study subgroups where guidelines are available.

METHODS

The data source for this study is the 2010 to 2012 Medicaid Analytic eXtract (MAX) data. Produced by the federal Centers for Medicare & Medicaid Services, MAX data are a set of person-level data files derived from the Medicaid Statistical Information System—the reporting system for states to provide Medicaid data on utilization and claims to CMS. The MAX data are organized into annual calendar year files based on service rendered each year. It includes extensive individual-level data on Medicaid eligibility, service utilization, and payments. Annual MAX data consist of one person summary (PS) file and four linkable claims files. The PS file contains summary information about each Medicaid enrollee during the year, including demographic and enrollment data as well as service utilization and expenditure measures.[14] The four claims files are inpatient (IP), institutional long-term (LT) care, prescription drug (RX), and other services (OT) files. The OT file includes all types of services that are not included in the IP, LT, or RX files, such as physician and other provider, clinic, home health, laboratory, x-ray, dental, outpatient hospital, and prescription administered by a physician or other provider. The MAX provides details on service claims, such as dates of service, types of service, Current Procedural Terminology (CPT) codes, International Classification of Diseases (ICD-9) codes, and National Drug codes.

Using the most recently available NYS MAX data 2010 to 2012, we examined annual adolescent HIV, CT, and GC testing service utilization among enrollees aged 13 to 19 years when service was rendered in the MAX IP and OT files. A beneficiary's age was determined as of December 31st of each study year. In this study, testing services included both testing of symptomatic individuals and screening of asymptomatic individuals. We used CPT, ICD-9, Healthcare Common Procedure Code, and HIV-specific rate codes to identify claims for testing services.

We also used ICD-9 and CPT codes to identify (1) female adolescents who had pregnancy-related services and (2) adolescents who had a diagnostic code indicating increased risk for HIV/STIs. A detailed description of the criteria used for identifying testing services used and for identifying pregnant females and at-risk adolescents is provided in the Appendix http://links.lww.com/OLQ/A186, including all the codes used and their descriptions.

In this study, health care encounter included only IP and OT claims and excluded LT care or RX claims. Each year's data were analyzed separately to obtain service utilization in each of the 3 years. Using the criteria described above, we first obtained a list of beneficiary identifiers of those individuals who had claims for each category of service in each of the 2 claim files—IP and OT files. We then merged the lists across the 2 files and deduplicated the list to provide a single final list of beneficiary identifiers of those who used each testing

service. Lastly, we merged the 2 claim files with the PS files to obtain months of enrollment data from the PS files.

We first calculated the percentage of enrollees in the overall study population by sex, age, and race/ethnicity who were tested for HIV, CT, and GC during each of the 3 years. A multivariable logistic regression analysis was performed to identify factors independently associated with testing service utilization. The independent variables included age group (13–15, 16–17, 18–19) sex (male, female), race/ethnicity (non-Hispanic White, non-Hispanic Black, Hispanic/Latino, Others), HIV/STI risk (no, yes), and months of enrollment (<6 months, 6–11 months, 12 months). We further examined testing service utilization in all female adolescents who had at least 1 health care encounter during each year, pregnant females, and adolescents at increased risk for HIV/STIs, including the changes of testing service utilization from 2010 to 2012.

In this study, due to lack of information on sexual activity in the MAX data, we did not directly estimate testing rates in sexually active adolescent females. Although the Healthcare Effectiveness Data and Information Set measure can be used to identify sexually active women seeking reproductive-related services, it has very limited representation of all young women who are sexually active.[15–17] Using the Healthcare Effectiveness Data and Information Set measure would substantially underestimate the percentage of adolescent females who were sexually active and overestimate testing rates of all sexually active adolescent females. Instead of estimating testing rates in a smaller proportion of sexually active females who received reproductive health services, we estimated testing rates in all adolescent females with 1 or more health care encounter. We compared the testing rates with the percentage of adolescent females who self-reported sexual activity in the 2009 to 2011 NYS YRBS surveys to indirectly estimate the testing rates in sexually active adolescent females.

RESULTS

Table 1 summarizes the characteristics of the NYS Medicaid-enrolled adolescents from 2010 to 2012, including demographics, enrollment, percentage of those with at least 6 months of enrollment each year, and percentage of those with at least 1 health care encounter each year. As shown in Table 2, annual HIV, CT, and GC testing rates among enrolled adolescents were much higher in females (7.8%, 18.0%, and 15.8%, respectively in 2012) than males (4.4%, 8.6%, and 7.6%, respectively in 2012), increased by age (1.5%, 5.7%, and 4.9%, respectively among 13–14 year olds in 2012 versus 11.1%, 19.3%, and 17.2%, respectively among 19 year olds in 2012); rates were also higher among black (6.7%, 15.2%, and 13.4%, respectively, in 2012) and Hispanic (8.6%, 18.9%, and 16.8%, respectively, in 2012) adolescents when compared with white (2.7%, 7.3%, and 6.3%, respectively, in 2012) adolescents. For 3 years, HIV, CT, and GC testing rates increased in all demographic subgroups with the exception that HIV testing rate decreased among white adolescents.

The results of the multivariable logistic regression analyses of factors independently associated with testing utilization are presented in Table 3. The analyses were based on 628,351 observations in 2012 (97% of the overall study population) that were not missing

data on any of the explanatory variables of interest. Testing rates for all 3 diseases were significantly higher among female adolescents, adolescents 16 years and older, black and Hispanic adolescents, those at increased risk for HIV/STIs, and those with at least 6 months of enrollment.

Among all female adolescents who accessed health care during each year from 2010 to 2012, CT and GC testing rates increased by age each year and increased in all age subgroups from 2010 to 2012 (Table 4). Each year, CT and GC testing rates were much higher in Hispanic and black adolescents than those in white and other race/ethnicity adolescents. For 3 years, CT and GC testing rates increased in all race/ethnicity subgroups. Of 301,620 (93.6% of all enrolled) adolescent females who accessed health care in 2012, only 19.2% and 16.9% were tested for CT and GC, respectively.

Among 17,803 (5.5%) pregnant adolescent females in 2012, only 35.2%, 53.9%, and 46.1% received HIV, CT, and GC testing, respectively (Table 5). Although the CT and GC testing rates increased among pregnant females from 2010 to 2012, HIV testing rate decreased slightly for 3 years. Of 6043 (0.9%) adolescents who were identified as being at increased risk in 2012, only 39.9%, 63.7%, and 54.4% received HIV, CT, and GC testing, respectively. Although the CT and GC testing rates increased among adolescents at increased risk from 2010 to 2012, the HIV testing rate remained relatively stable for 3 years.

DISCUSSION

Given limited data available on the current state of adolescent HIV/STI testing utilization, this study provides important information about the recent testing service rendered in a large Medicaid-enrolled adolescent population. The results of this study can serve as baseline data and be used to monitor success in local efforts to close gaps between recommended and actual levels of testing utilization, such as public health campaigns or clinical quality improvement programs, as well as provide important parameter estimates for in-depth studies of those interventions. We found that testing utilization for all 3 diseases were significantly higher among female adolescents, older adolescents, black and Hispanic adolescents, those at increased risk for HIV/STIs, and those enrolled at least 6 months each year; furthermore, testing service utilization for all 3 diseases increased from 2010 to 2012 in the overall study population as well as in most demographic subgroups. Our results also suggest that a gap exists between the expected level of testing and the actual level of testing utilization among sexually active females, pregnant females, and all adolescents at increased risk for HIV/STIs.

According to NYS YRBS data, approximately 30% of female high schools students were sexually active each year between 2009 and 2011.[1] According to national guidelines,[4,5] one would expect testing for GC and CT in adolescent females to approach 30% during this period. However, our analysis of all adolescent females who accessed health care each year showed that only 19% were tested for CT and 17% were tested for GC in 2012. Although the testing rates increased substantially from 2010 to 2012, we estimated that approximately 37% of sexually active female adolescents remained untested for CT and 43% were untested for GC in 2012. The testing rates among pregnant females were also lower than expected,

46% of pregnant females were not tested for CT and 54% were not tested for GC in 2012. In addition, the HIV testing rate in pregnant females was substantially lower than what would be expected; even more worrisome, HIV testing decreased for 3 years from 38.04% to 35.16%. Based on the criteria we used in this study for defining adolescents at increased risk for HIV/STIs, one would expect CT and GC testing rates in this subgroup to be much higher than what we observed in this study and should likely approach 100%. Although the testing rates increased substantially for 3 years, 36% remained untested for CT and 46% untested for GC in 2012.

Our findings on the effect of age and sex on testing utilization are generally consistent with those of previous research.[12,18] First, female adolescents are more likely to interact with the health care system when compared with males.[18] Second, sexual activity and sexual risk increase with age. Third, there are clear guidelines for CT/GC testing of sexually active adolescent females, but not for sexually active males. The effect of race/ethnicity on testing utilization is consistent with a previous study of HIV care in the Medicaid population[19]; and this may be a result of increased awareness of disease burden and recommendations for testing in high-prevalence populations.[20,21] The effect of belonging to the predefined increased risk group on testing utilization is reassuring and suggests increased awareness about risk behaviors and HIV/STI-related exposures among at-risk adolescents and their health care providers. The effect of enrollment eligibility on testing service utilization is expected and suggests that adolescents need continual enrollment in Medicaid to receive needed services.

This study's major strength is that a large data set with standardized claim codes was used to identify service utilization. In contrast, survey-based data that ask participants to self-report their sexual health services utilization can be subject to social desirability biases where participants may underreport or overreport their service utilization.[22] Another study strength is our analyses of pregnant females and all adolescents at increased risk provide strong evidence for lack of testing utilization among those who not only clearly needed the services but also already accessed the health care system and were identified by the provider as eligible for HIV and STI testing. In recent years, to increase HIV/STI testing among adolescents, public health efforts have focused on increasing awareness of HIV/STI testing recommendations and referral services through school-based programs or community-based programs.[10] However, those efforts may fall short if at-risk adolescents do not receive the recommended testing when referred to health care providers.

This study also has some limitations. First, claim-based administrative data are subject to coding errors. Second, claim-based data do not provide a clear distinction between screening tests for asymptomatic persons versus diagnostic tests for persons seeking STI care and do not provide information on laboratory test results and sexual activity. Thus, we were not able to accurately identify tests performed on symptomatic individuals; sexually active individuals; MSM; individuals infected with HIV, CT, or GC; or at-risk adolescents using STD diagnoses. Given these limitations, we were unable to examine implementation of the following recommended testing services: HIV testing of all persons who seek evaluation and treatment of STIs; CT and GC testing of all sexually active persons living with HIV; HIV, CT, and GC testing of MSM; and CT and GC testing of sexually active female adolescents.

Third, our data only capture testing services billed to NYS Medicaid. Privately insured adolescents or those who access care through STD or Title X clinics or other settings that may not generate billing (eg, juvenile justice system services) are not represented in this study. Fourth, our inability to distinguish screening tests from diagnostic tests that rule out or rule in a condition, actual levels of screening are overestimated in identifying gaps in recommended levels of screening. Fifth, we may have underestimated testing rates in pregnant women because a small proportion of pregnant women had labor or delivery early in the calendar year and were only tested in the prior calendar year.

To effectively prevent HIV/STI transmission and reduce the burden of HIV/STI in adolescent populations, provider compliance with evidence-based guidelines for adolescent sexual health services is essential. The findings of this study suggest progress had been made by NYS providers to comply with the recommended testing services for adolescents. However, there was a clear gap between the recommended testing and the actual level of testing among certain adolescent subgroups who needed the services (ie, sexually active females, pregnant females, and at-risk adolescents), which indicate missed opportunities for early detection and treatment of HIV, CT, and GC. Community providers outside the public health system have not traditionally collaborated with health departments on practice improvement initiatives. As a result of health care reform, at-risk adolescents who had traditionally been served by public health are now accessing health care providers in the community.[23] Our study results suggest that opportunities exist for public health and community provider (ie, private health care providers, public clinics, and schools) collaboration to increase adolescent HIV and STI testing.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1.

Characteristics of the NYS Medicaid-Enrolled Adolescents, 2010–2012

	Enrollment (N)			Enrollees Who Had ≥ 6 Months Enrollment (%)			Enrollees Who Had ≥ 1 Health Care Encounter (%)		
Demographics	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Sex									
Male	297,864	302,914	323,322	88.2	88.0	88.4	86.4	91.3	93.6
Female	303,302	305,477	322,215	86.8	86.7	87.6	87.0	91.6	93.6
Age, y									
13–14	162,217	166,780	182,017	89.8	89.3	89.6	88.6	92.8	94.8
15	82,284	83,125	88,774	89.4	89.2	89.1	87.7	92.6	94.5
16	84,893	84,965	89,978	88.8	88.5	88.7	87.4	92.1	94.0
17	85,887	87,254	91,435	88.4	88.2	88.3	86.6	91.3	93.4
18	88,627	89,284	94,878	86.9	86.5	87.0	85.0	90.1	92.5
19	97,258	96,983	98,455	80.7	81.6	83.8	83.9	89.1	91.5
Race/ethnicity									
Non-Hispanic white	162,720	165,392	180,840	86.3	85.9	86.9	88.6	90.2	92.4
Non-Hispanic black	156,880	152,622	155,211	87.7	87.7	88.5	88.0	91.4	93.6
Hispanic or Latino	191,731	197,944	210,916	88.6	88.6	89.3	88.7	94.1	95.7
Others	89,835	92,433	98,570	87.7	87.9	88.3	76.9	88.1	91.3
All	601,166	608,391	645,537	87.5	87.4	88.0	86.7	91.5	93.6

TABLE 2.

Percentage of Enrolled Adolescents Tested for HIV, CT, and GC, 2010–2012

	HIV Testing (%)			CT Testing (%)			GC Testing (%)		
Demographics	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**	**2010**	**2011**	**2012**
Sex									
Male	2.5	3.5	4.4	5.2	7.3	8.6	4.5	6.4	7.6
Female	7.2	7.4	7.8	11.7	15.9	18.0	10.0	13.7	15.8
Age, y									
13–14	0.9	1.3	1.5	3.5	5.1	5.7	3.1	4.4	4.9
15	2.4	3.1	3.5	6.6	9.4	10.6	5.8	8.1	9.3
16	4.2	4.9	5.2	9.1	12.6	14.5	7.9	10.8	12.7
17	6.1	6.9	7.1	11.0	15.1	17.3	9.4	13.0	15.3
18	8.2	9.0	9.4	12.2	16.5	19.1	10.4	14.3	16.8
19	10.0	10.6	11.1	12.1	16.3	19.3	10.4	14.3	17.2
Race/ethnicity									
Non-Hispanic white	3.6	3.1	2.7	5.2	6.5	7.3	4.5	5.7	6.3
Non-Hispanic black	5.5	6.4	6.7	9.6	13.5	15.2	8.2	11.6	13.4
Hispanic or Latino	6.3	7.7	8.6	12.0	16.5	18.9	10.4	14.4	16.8
Others	3.0	3.2	3.7	4.8	7.2	9.3	4.1	6.1	8.0
All enrolled	4.9	5.4	5.7	8.5	11.6	13.3	7.3	10.1	11.7

TABLE 3.

Factors Associated With Testing Utilization, 2012

	HIV Testing		CT Testing		GC Testing	
	OR	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Sex						
Male (reference)						
Female	1.84	1.80–1.89	2.39	2.36–2.43	2.34	2.30–2.38
Age, y						
13–15 (reference)						
16–17	2.98	2.88–3.08	2.52	2.48–2.58	2.48	2.42–2.53
18–19	5.48	5.32–5.65	3.36	3.29–3.42	3.23	3.23–3.36
Race/ethnicity						
Non-Hispanic white (reference)						
Non-Hispanic black	2.59	2.50–2.68	2.33	2.28–2.39	2.29	2.23–2.35
Hispanic or Latino	3.47	3.36–3.59	3.11	3.04–3.18	3.07	3.00–3.14
Others	1.42	1.36–1.49	1.40	1.36–1.45	1.37	1.33–1.42
Risk level						
Without increased risk (reference)						
With increased risk	7.55	7.13–8.00	8.59	8.11–9.10	6.43	6.08–6.79
Months of eligibility						
<6 (reference)						
6–11	3.85	3.60–4.12	3.42	3.28–3.57	3.32	3.18–3.48
12	5.70	5.35–6.07	5.57	5.35–5.80	5.22	5.01–5.45

OR, odds ratio; 95% CI, 95% confidence interval.

TABLE 4.

CT and GC Testing Among Adolescent Females Who Had at Least 1 Health Care Encounter, 2010–2012

	CT Testing (%)			GC Testing (%)		
	2010	**2011**	**2012**	**2010**	**2011**	**2012**
Age, y						
13–14	4.8	6.6	7.0	4.2	5.8	6.1
15	9.3	12.4	13.6	8.2	10.7	11.9
16	13.5	17.4	19.8	11.6	15.0	17.4
17	17.2	22.0	24.5	14.5	19.1	21.7
18	20.0	25.6	28.9	17.0	22.1	25.4
19	21.1	26.9	30.8	17.9	23.4	27.4
Race/ethnicity						
Non-Hispanic white	9.7	12.0	12.9	8.3	10.6	11.3
Non-Hispanic black	15.0	20.1	22.1	12.8	17.2	19.5
Hispanic or Latino	17.2	22.0	24.8	14.7	19.0	21.9
Others	8.7	11.5	13.5	7.4	9.7	11.8
All	13.5	17.3	19.2	11.5	15.0	16.9

TABLE 5.

Testing Service Utilization Among Adolescents at Increased Risk and Pregnant Females, 2010–2012

	Adolescents at Increased Risk			Pregnant Females		
	2010	**2011**	**2012**	**2010**	**2011**	**2012**
HIV testing (%)	39.08	38.41	39.88	38.04	35.31	35.16
CT testing (%)	45.94	58.66	63.68	36.39	46.40	53.89
GC testing (%)	38.37	47.06	54.36	30.00	38.43	46.09