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Sexually Transmitted Infection Testing of HIV-Positive Medicare and Medicaid Enrollees Falls Short of Guidelines

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Background: Men who have sex with men with HIV have high sexually transmitted infection (STI) incidence. Thus, the Centers for Disease Control and Prevention (CDC) recommends at least yearly STI screening of HIV-infected individuals.

Methods: We calculated testing rates for syphilis, chlamydia, and gonorrhea among HIV-positive Californians with Medicare or Medicaid insurance in 2010. Logistic regressions estimated how testing for each bacterial STI relates to demographic and provider factors.

Results: Fewer than two-thirds of HIV-positive Medicare and fewer than three-quarters of Medicaid enrollees received a syphilis test in 2010. Screenings for chlamydia or gonorrhea were less frequent: approximately 30% of Medicare enrollees were tested for chlamydia or gonorrhea in 2010, but higher proportions of Medicaid enrollees were tested (45%–46%). Only 34% of HIV-positive Medicare enrollees who were tested for syphilis were also screened for chlamydia or gonorrhea on the same day. Nearly half of Medicaid enrollees were tested for all 3 STIs on the same day. Patients whose providers had more HIV experience had higher STI testing rates.

Conclusions: Testing rates for chlamydia and gonorrhea infection are low, despite the increase in these infections among people living with HIV and their close association with HIV transmission. Interventions to increase STI testing include the following: prompts in the medical record to routinely conduct syphilis testing on blood drawn for viral load monitoring, opt-out consent for STI testing, and provider education about the clinical

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importance of STIs among HIV-positive patients. Last, it is crucial to change financial incentives that discourage nucleic acid amplification testing for rectal chlamydia and gonorrhea infections.

The Centers for Disease Control and Prevention[1] estimates that 1.9 million new cases of bacterial sexually transmitted infections (STIs; primary and secondary [P&S] syphilis, chlamydia, gonorrhea) were diagnosed in the United States in 2015. After years of decline, rates of STI have been growing. The national rate of reported P&S syphilis was 4 times greater in 2015 than it had been in 2000.[1] Reported new chlamydia diagnoses grew by 90% between 2000 and 2015.[1] Rates of gonorrhea infection per 100,000 population reached a historic low in 2009 but increased 26% by 2015.[1]

Bacterial STIs are prevalent among people living with HIV (PLWH), reflecting high rates among men who have sex with men (MSM), who account for 78% of HIV transmissions nationally.[2] Men who have sex with men now account for 60% of all P&S syphilis cases and 82% of the cases among men. Between 2007 and 2013, the number of new cases of syphilis among MSM grew from approximately 5000 per year to 8200 per year, an increase of 64%.[3] Black MSM had more than twice the rates of incident P&S syphilis as compared with all MSM. Furthermore, P&S rates are growing particularly among young (13–24 years), black MSM living in the largest metropolitan areas, who reported twice the number of syphilis diagnoses in 2008 as they had in 2004.[4]

Among MSM, the HIV-infected have the highest prevalence and experienced the greatest increase in syphilis diagnosis.[5] Among MSM visiting Sexually Transmitted Disease Surveillance Network clinics, prevalence of P&S syphilis was 10.3% among HIV-positive men and 2.6% among HIV-negative MSM.[1] HIV-positive MSM accounted for 82% of the syphilis cases among men in 2015.[1] The high rates of syphilis among HIV-positive MSM are a particular health concern[6] because syphilis infection increases HIV viral load and decreases CD4 in HIV-infected persons, thereby increasing the chance that PLWH transmit the virus.[7–10]

To detect asymptomatic STIs, the Centers for Disease Control and Prevention (CDC) recommends at least annual STI testing for MSM rather than symptom-driven testing.[11] Men who have sex with men are more likely than other men to be tested for STIs at least once annually (26.2% vs 15.6%), yet STI testing is far from universal, even among HIV-positive MSM, who have the highest rates of STIs.[1] Among people in treatment of HIV monitored in the Medical Monitoring Project, only 43% of sexually active PLWH received a test for gonorrhea, 43% for chlamydia, and 65% for syphilis in calendar 2013.[2,12,13] Screening rates were even lower in a sample of commercially insured HIV-positive patients aged 18 to 64 years: 22.2% were tested for chlamydia, 21.9% for gonorrhea, and 51.1% for syphilis.[14] Hoover et al.[15] found relatively high annual rates of screening for syphilis (66%–76%) in large HIV clinics in 2004 to 2006, perhaps

attributable to the fact that 7 of the 8 sites studied were Ryan White clinics, which are required to screen for syphilis. These clinics had lower rates of testing for chlamydia and gonorrhea (2.3%–18%), and most of these tests did not include rectal testing.

Given the high rates of syphilis, gonorrhea, and chlamydia among PLWH, it is important to know whether people in treatment of HIV meet minimum CDC guidelines for annual screening for STIs. We examine the factors that relate to the odds of PLWH being tested for syphilis, chlamydia, and gonorrhea in 2010. This article extends the research on STIs among PLWH by examining a large sample of PLWH with Medicare or Medicaid insurance who received medical care in a variety of settings.

MATERIALS AND METHODS

Data

Medicare and Medicaid claims data for HIV-positive Californians were acquired through a confidential data use agreement with the Centers for Medicare and Medicaid Services (CMS). We distinguished Medicare beneficiaries enrolled solely in Medicare from those enrolled dually in both Medicare (the primary payer) and Medicaid (hereafter, Duals). Beneficiaries enrolled solely in Medicaid (Medicaid-only) were analyzed separately. We applied a case identification algorithm to create an analysis file of adult beneficiaries with verifiable HIV.[16] The sample includes full-year fee-for-service enrollees, because managed care data lack diagnosis fields needed to confirm HIV status. Nearly half of the 6246 Medi-Cal enrollees who met the previously mentioned criteria (3104) were not included in the analysis sample because they visited a federally qualified or a rural health center and therefore lacked claims data to document procedures such as STI testing. There were 3142 individuals in the Medi-Cal analysis sample. None of the 11,465 Medicare enrollees were dropped for this reason.

Data acquisition was reviewed and approved by the CMS Privacy Board. Research was also approved by the UCLA Institutional Review Board.

Outcome Variables

This article examines testing for 3 bacterial STIs (chlamydia, gonorrhea, and syphilis). Outpatient claim procedure codes shown in Appendix A were used to identify tests for each of the 3 STIs at least once during the year.

Predictor Variables

Enrollment data from CMS provided information on participant sex, age (<40, 40-54, and ≥55 years), and race and ethnicity (non-Hispanic white, African American, Hispanic, other). Reason for Medicare or Medicaid coverage was coded as "disability" or other (eg, aged). A provider's HIV patient case load predicts quality of care better than provider specialty[17]; thus, we measure an individual's access to an HIV specialist by whether he/she had an evaluation and management visit with any provider who treated 50 or more Medicare or Medicaid HIV patients in California in 2010.[18]

Statistical Analysis

Screening rates for each of the STIs were calculated by patient characteristics separately for Medicare and Medicaid-only enrollees. We also examined how frequently the STI screenings were performed at the same visit. We estimated logistic regressions to examine how testing for each of the bacterial STIs relates to demographic factors.

RESULTS

Sample Characteristics

There were 11,465 PLWH covered by Medicare (10,238 men and 1227 women) in California in 2010 (Table 1). In addition, there were 3142 PLWH (2298 men and 844 women) meeting the sample inclusion criteria who were covered only by Medicaid. Consistent with the demographics of the 115,700 PLWH in California in 2010,[19] most of both samples were male (89% of the Medicare sample and 73% of the Medicaid sample). Racial composition differed between the 2 groups. The Medicare sample was 58% white and 19% African American. The Medicaid-only sample was 37% white and 34% African American. Hispanics constituted 19% of each insurance group (Table 1). Younger PLWH (≤40 years) account for larger shares of the Medicaid (18%) than the Medicare samples (7%).

STI Testing Rates

Rates of syphilis testing for Medicaid enrollees were higher than for Medicare enrollees in 2010 (74% vs 65%). Screenings for chlamydia or gonorrhea were much less frequent than for syphilis. Approximately 30% of Medicare enrollees were tested for chlamydia or gonorrhea in 2010, but higher proportions of Medicaid enrollees were tested (45%–46%; Table 1). Women were somewhat less likely than men to receive a syphilis test (51% of female Medicare enrollees and 68% of female Medicaid enrollees were tested for syphilis in 2010; $P < 0.001$ in both cases).

There was considerable overlap in testing for chlamydia or gonorrhea. In 97% of the cases, a test for chlamydia was accompanied by a test for gonorrhea on the same day. However, only 34% of Medicare PLWH enrollees tested for syphilis were screened for chlamydia or gonorrhea on the same day (a total of 38% within 30 days of a syphilis test.) However, nearly half of Medicaid enrollees who were tested for syphilis also received tests for gonorrhea and chlamydia on the same day (53% within a month of the syphilis test).

Multivariate Predictors of STI Testing

Table 2 presents logistic regression estimates of the effect of predictor variables on the odds of being tested for each of the 3 bacterial STIs. Women were less likely to be tested for syphilis than men in both Medicare (adjusted odds ratio [aOR], 0.52; 95% confidence interval [CI], 0.46–0.59) and Medicaid (aOR, 0.66; 95% CI, 0.55–0.79) samples. African American Medicare enrollees had significantly greater odds of being tested for chlamydia (aOR, 1.22; 95% CI, 1.09–1.36) and gonorrhea (aOR, 1.19; 95% CI, 1.06–1.33) compared with whites. Hispanic enrollees were more likely than whites to be tested for each of the bacterial STIs, with the exception of Medicaid testing for syphilis. Testing for chlamydia and gonorrhea was more likely for those younger than 40 years than for those 40 years or older. Medicare enrollees older than 55 years were also less likely to be tested for syphilis than those younger than 40 years. Medicare patients with access to providers with greater HIV caseloads were more likely to be tested for all 3 bacterial STIs than those without access to a high-volume HIV provider. Medicaid patients with access to large-volume HIV providers had greater odds of getting tested for syphilis compared with those with only low-volume providers, but this was not the case for chlamydia or gonorrhea.

DISCUSSION

Responding to what has been called a "hidden epidemic"[20] and the fact that many who are infected with STIs are asymptomatic

TABLE 1. Demographics and STI Testing Among HIV-Positive Publically Insured Californians, 2010

	Overall		Syphilis Test			Chlamydia Test			Gonorrhea Test		
	N	**(% of total)**	**n**	**(% of group)**	**P**	**n**	**(% of group)**	**P**	**n**	**(% of group)**	**P**
Medicare											
Total	11465		7451	(65.0)		3413	(29.8)		3355	(29.3)	
Enrollment											
Medicare only	3824	(33.4)	2245	(58.7)	<0.01	861	(22.5)	<0.01	846	(22.1)	<0.01
Dual	7641	(66.6)	5206	(68.1)		2552	(33.4)		2509	(32.8)	
Sex											
Male	10238	(89.3)	6827	(66.7)	<0.01	3029	(29.6)	0.22	2987	(29.2)	0.55
Female	1227	(10.7)	624	(50.9)		384	(31.3)		368	(30.0)	
Race											
White	6664	(58.1)	4283	(64.3)	0.02	1754	(26.3)	<0.01	1724	(25.9)	<0.01
African American	2124	(18.5)	1383	(65.1)		695	(32.7)		670	(31.5)	
Hispanic	2175	(19.0)	1471	(67.6)		830	(38.2)		828	(38.1)	
Other	502	(4.4)	314	(62.5)		134	(26.7)		133	(26.5)	
Age category, y											
<40	835	(7.3)	582	(69.7)	<0.01	336	(40.2)	<0.01	328	(39.3)	<0.01
40–54	6200	(54.1)	4325	(69.8)		2056	(33.2)		2022	(32.6)	
≥55	4430	(38.6)	2544	(57.4)		1021	(23.0)		1005	(22.7)	
Eligibility											
Other	1359	(11.9)	687	(50.6)	<0.01	222	(16.3)	<0.01	219	(16.1)	<0.01
Disabled	10106	(88.1)	6764	(66.9)		3191	(31.6)		3136	(31.0)	
Highest-volume HIV provider											
0–49	4549	(39.7)	2254	(49.5)	<0.01	919	(20.2)	<0.01	913	(20.1)	<0.01
50+	6916	(60.3)	5197	(75.1)		2494	(36.1)		2442	(35.3)	
Medicaid											
Total	3142		2314	(73.6)		1446	(46.0)		1419	(45.2)	
Sex											
Male	2298	(73.1)	1741	(75.8)	<0.01	1035	(45.0)	0.07	1029	(44.8)	0.48
Female	844	(26.9)	573	(67.9)		411	(48.7)		390	(46.2)	
Race											
White	1151	(36.6)	853	(74.1)	0.40	501	(43.5)	<0.01	498	(43.3)	<0.01
African American	1051	(33.5)	770	(73.3)		489	(46.5)		470	(44.7)	
Hispanic	592	(18.8)	446	(75.3)		310	(52.4)		309	(52.2)	
Other	348	(11.1)	245	(70.4)		146	(42.0)		142	(40.8)	
Age category, y											
<40	570	(18.1)	418	(73.3)	0.02	307	(53.9)	<0.01	296	(51.9)	<0.01
40–54	1851	(58.9)	1392	(75.2)		848	(45.8)		838	(45.3)	
≥55	721	(22.9)	504	(69.9)		291	(40.4)		285	(39.5)	
Eligibility											
Other	116	(3.7)	73	(62.9)	0.01	51	(44.0)	0.65	51	(44.0)	0.79
Disabled	3026	(96.3)	2241	(74.1)		1395	(46.1)		1368	(45.2)	
Highest-volume HIV provider											
0–49	1065	(33.9)	682	(64.0)	<0.01	484	(45.4)	0.64	479	(45.0)	0.88
50+	2077	(66.1)	1632	(78.6)		962	(46.3)		940	(45.3)	

and undiagnosed, the CDC recommends at least annual STI testing of sexually active PLWH.[11] Nonetheless, we found that in 2010, fewer than two-thirds of HIV-positive Medicare and fewer than three-quarters of Medicaid enrollees received a test for syphilis. Rates were even lower for chlamydia and gonorrhea (~30% of Medicare enrollees and fewer than half of Medicaid enrollees). Women and older PLWH were significantly less likely to be tested for bacterial STIs. These findings have implications for both HIV providers and for health policy.

Implications for HIV Providers

Making STI screening (rather than symptom-driven STI testing) a routine part of medical care for PLWH is important because it would identify many STIs that are asymptomatic and that carry significant morbidity and, in rare cases, mortality, if left untreated. Not only can these STIs be secondarily transmitted, but they also increase HIV infectiousness. Providers often fail to identify patients who are at risk for STIs because they do not

elicit information on sexual risk behaviors and patients frequently do not reveal sexual behaviors that would put them at risk for STIs.[21] In particular, gonorrhea and chlamydia are often asymptomatic, so patients are less likely to report symptoms of the infection that would lead to testing. One study found that symptom- and sexual history–based testing identified only half of the chlamydia and gonorrhea cases identified through universal screening.[21]

Our analyses confirm that testing rates for chlamydia and gonorrhea infection are low, despite the increase in these infections in PLWH and their close association with HIV transmission.[7–10] Gonorrhea and chlamydia had greater incidence compared with syphilis among HIV-negative MSM; however, among HIV-positive MSM, new syphilis were more frequently diagnosed (14.3%) than chlamydia (8.7%) or gonorrhea cases (10.4%).[3] Even PLWH known to be at risk for STIs are not commonly tested. One study found that only one-quarter of patients diagnosed as having incident syphilis were screened for gonorrhea and chlamydia.[22]

"Opt-out" strategies have been effective in increasing HIV testing rates and could potentially also increase STI testing. Blood

TABLE 2. Logistic Regressions of Testing for STIs Among HIV Positive Publically Insured Californians, 2010

	Syphilis		Chlamydia		Gonorrhea	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Medicare						
Dual	1.21	(1.10–1.32)	1.27	(1.15–1.40)	1.28	(1.16–1.41)
Female	0.52	(0.46–0.59)	1.08	(0.94–1.23)	1.03	(0.90–1.18)
African American	1.04	(0.93–1.17)	1.22	(1.09–1.36)	1.19	(1.06–1.33)
Hispanic	1.15	(1.03–1.28)	1.63	(1.47–1.82)	1.67	(1.50–1.85)
Other	1.00	(0.82–1.22)	1.03	(0.83–1.27)	1.04	(0.84–1.29)
Age 40–54 y	0.99	(0.84–1.17)	0.79	(0.68–0.92)	0.80	(0.68–0.93)
Age >55 y	0.68	(0.57–0.80)	0.58	(0.49–0.68)	0.59	(0.50–0.69)
Disabled	1.16	(1.01–1.33)	1.43	(1.21–1.70)	1.43	(1.21–1.70)
Highest-volume provider has 50+ HIV patients	2.92	(2.69–3.16)	2.12	(1.94–2.32)	2.07	(1.89–2.26)
Medicaid						
Female	0.66	(0.55–0.79)	1.17	(0.99–1.37)	1.07	(0.91–1.26)
African American	1.03	(0.84–1.25)	1.10	(0.93–1.31)	1.05	(0.88–1.25)
Hispanic	1.18	(0.93–1.49)	1.39	(1.14–1.71)	1.40	(1.15–1.72)
Other	0.85	(0.65–1.12)	0.91	(0.71–1.16)	0.88	(0.69–1.13)
Age 40–54 y	1.03	(0.82–1.29)	0.72	(0.59–0.87)	0.76	(0.63–0.93)
Age >55 y	0.80	(0.62–1.03)	0.57	(0.46–0.72)	0.61	(0.48–0.76)
Disabled	1.33	(0.88–2.00)	1.40	(0.95–2.07)	1.29	(0.88–1.91)
Highest-volume provider has 50+ HIV patients	2.10	(1.78–2.48)	1.04	(0.90–1.21)	1.03	(0.88–1.19)

drawn for monitoring viral loads could be used to screen for syphilis at minimal additional cost and burden. This strategy could quickly increase the rate of syphilis testing because more than 90% of publicly insured patients living with HIV have been prescribed antiretroviral medications and 85% are regularly tested for CD4 and/or viral load.[23] Increasing screening for gonorrhea and chlamydia will be more challenging because of the characteristics of the different tests. Syphilis tests are serologic, but accurate diagnoses of gonorrhea and chlamydia require rectal, urethral, and/or pharyngeal samples, which patients find more physically and emotionally undesirable.[24] Indeed, urine testing is the most common testing modality, but it cannot detect rectal infections. A study of STI testing of MSM visiting sexually transmitted disease clinics found that 83.9% of the MSM were tested for urogenital gonorrhea and 81.4% for urogenital chlamydia, many fewer than received rectal tests for gonorrhea (50.4%) or chlamydia (45.9%). The authors found that 70% of extragenital gonorrhea infection and 85% of chlamydia infections occurred in MSM who had negative urethral test results at the same visit. Thus, these infections would not have been detected by urethral screening alone.[25] Studies of STI testing among MSM have found that only 10% of first testing episodes included extragenital sites.[26] Patient stigma, shame, fear of invasive sampling, and confidentiality concerns as well as clinicians' time pressures and lack of cultural competency act as barriers to testing in rectal sites. Self-collection of specimens, a method with "acceptable diagnostic accuracy," is an alternative that would address both patient and provider issues.[24] Self-collection of rectal swabs has been found as valid as clinician-collected samples and is equally or more acceptable to most patients.[27]

The greater frequency of STI testing among patients with access to more experienced HIV providers suggests that non-HIV specialists' lack of prioritization of STI testing or their discomfort in having anatomically specific discussions of sexual acts and collecting rectal samples could be barriers to their implementing routine screening. Indeed, an experiment that both educated providers about the importance of screening for gonorrhea, chlamydia, and syphilis and introduced a sexual risk assessment for patients resulted in significant increases in screening.[28] Automated structural changes, such as including a prompt in the electronic medical record to screen HIV-positive patients for STIs at regular intervals, could help to overcome a multiple barriers to routinization of the CDC's STI screening recommendations.

Implications for Health Policy

Several policies raise financial hurdles to obtaining preventive screenings for chlamydia and gonorrhea. The US Preventive Services Task Force finds insufficient evidence of net benefits of chlamydia and gonorrhea screening in men.[29] These screenings can be financially penalized because insurance reimbursement is often based on US Preventive Services Task Force evaluations.

Medicare will cover annual syphilis screening for "men and women at increased risk for STIs," but chlamydia and gonorrhea screening seems to be covered only for pregnant women and women at increased risk for STIs.[30] The high STI incidence rates among nonpregnant PLWH means that many infections will go undetected because of lack of symptoms and lack of full sexual histories.

The CDC recommends that laboratories test for gonorrhea and chlamydia using nucleic acid amplification tests (NAATs), which have greater sensitivity than culture, but the Food and Drug Administration (FDA) has not yet cleared NAAT screening for extragenital specimens.[31,32] Although laboratories that have met all validation requirements for an off-label procedure may use them, most insurance plans, including Medicare, will not cover non–FDA-cleared tests. Medicare and Medi-Cal will nominally reimburse NAAT for diagnostic purposes but will not reimburse for rectal STI screenings using NAAT technology. Rates of pharyngeal and rectal infections among asymptomatic HIV-positive MSM are high, so the lack of FDA clearance of these tests may present a substantial barrier to identifying STIs in extragenital sites. A further hurdle is that Medicare will cover only STI screenings ordered by a primary care provider. More than half of providers to PLWH do not classify themselves as "primary care" providers; thus, it may be difficult for them to get reimbursed by CMS for STI screening.[32]

This study has a number of limitations. First, the data relate only to California and patients treated in fee-for-service settings other than federally qualified and rural health centers. Thus, findings may not generalize to other states, managed care settings, or safety-net providers. Second, the insurance claims data include only STI tests submitted for insurance reimbursement. However, we believe that lack of billing is not a major problem because most

freestanding STI clinics, such as Planned Parenthood, do bill Medicare and Medicaid for their publicly insured patients. The claims data do not indicate whether the sample for gonorrhea and chlamydia testing was taken from an extragenital site and perhaps intentionally mislabeled for purposes of testing and/or billing. However, other studies suggest that extragenital testing is rare.[15] The CDC guidelines apply to sexually active patients. Although we did not have data on sexual activity, more than 60% of PLWH are sexually active.[13] Last, we were unable to assess treatment of STIs, relapses, and reinfections, important parameters in completing the understanding of the STI diagnostic and therapeutic landscape.

Our study also has a number of strengths. It uses STI testing data for bacterial STIs for large numbers of Medicare and Medicaid enrollees with HIV, a group with very high rates of STIs. It examines care for PLWH in a wide variety of settings and is not limited to a small sample or a single clinic, as in many prior analyses.

Increasing rates of condomless anal sex among MSM have led to increases in STIs at the same time that transmission of HIV has fallen as a result of antiretroviral therapy's effect on reducing HIV viral loads.[1,2] Untreated STIs adversely affect the health of patients with HIV and increase the likelihood of transmitting the HIV virus to others. Incorporating STI testing as a routine part of HIV care and treatment visits would increase detection and treatment of STIs for PLWH. However, the lack of FDA approval for NAAT on rectal and pharyngeal samples remains a significant barrier. Regular STI screening constitutes an important component of medical care for people with HIV infection such that the infections can be treated to reduce morbidity and secondary transmission of the both HIV and STIs to others.

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APPENDIX

TABLE A. *CPT* Codes Used to Identify STI Tests

CPT Code	Description		No. procedures	No. people
87110	Chlamydia culture	Chlamydia test	81	74
87270	*Chlamydia trachomatis* Ag IF	Chlamydia test	<11	<11
87320	*C trachomatis* Ag EIA	Chlamydia test	<11	<11
87490	*C trachomatis* DNA dir probe	Chlamydia test	153	126
87491	*C trachomatis* DNA amp probe	Chlamydia test	9726	5691
87492	*C trachomatis* DNA quant	Chlamydia test		
87810	*C trachomatis* assay with optic	Chlamydia test	15	15
87590	*Neisseria gonorrhoeae* DNA dir probe	Gonorrhea test	165	136
87591	*N gonorrhoeae* DNA amp probe	Gonorrhea test	9586	5614
87592	*N gonorrhoeae* DNA quant	Gonorrhea test	<11	<11
87850	*N gonorrhoeae* assay with optic	Gonorrhea test	15	15
86780	*Treponema pallidum*	Syphilis test	2147	1135
86592	Syphilis test non-trep qual	Syphilis test	23756	11204
86593	Syphilis test non-trep quant	Syphilis test	2625	1215
80055	Obstetric panel	Syphilis test	<11	<11