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Expanding hospital HIV testing in the Bronx, New York and Washington, D.C.: Results from the HPTN 065 study

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Abstract

Background—HIV testing is critical for both HIV treatment and prevention. Expanding testing in hospital settings can identify undiagnosed HIV infections.

Methods—To evaluate the feasibility of universally offering HIV testing during emergency department (ED) visits and inpatient admissions, 9 hospitals in the Bronx, New York and 7 in Washington DC undertook various efforts to encourage staff to offer HIV testing routinely. Outcomes included the percentage of encounters with an HIV test, the change from year 1 to year 3, and the percentages of tests that were HIV-positive and new diagnoses.

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Results—From February 1, 2011 to January 31, 2014, HIV tests were conducted during 6.5% of 1,621,016 ED visits and 13.0% of 361,745 inpatient admissions in Bronx hospitals and 13.8% of 729,172 ED visits and 22.0% of 150,655 inpatient admissions in DC, with wide variation by hospital. From year 1 to year 3, testing was stable in the Bronx (6.6% to 6.9% of ED visits, 13.0% to 13.6% of inpatient admissions), but increased in DC (11.9% to 15.8% of ED visits, 19.0% to 23.9% of inpatient admissions). Overall, in the Bronx 0.4% (408) of ED HIV tests were positive, 0.3% (277) were new diagnoses; 1.8% (828) of inpatient tests were positive, 0.5% (244) were new diagnoses. In DC, 0.6% (618) of ED tests were positive, 0.4% (404) were new diagnoses; 4.9% (1349) of inpatient HIV tests were positive, 0.7% (189) were new diagnoses.

Conclusion—Hospitals consistently identified previously undiagnosed HIV infections, but universal offer of HIV testing proved elusive.

Keywords

Routine HIV screening; HIV testing in emergency departments; HIV testing of hospital inpatients

Background

Testing to identify HIV infection is an essential first step for both treatment and prevention.[1] With sustained viral suppression, persons living with HIV can have a nearly normal life expectancy and substantially reduce the risk of transmitting HIV.[2, 3] Public health authorities in the United States recommend routine HIV screening in health care settings and targeted testing for persons at increased risk to facilitate the diagnosis of unrecognized HIV infection.[4, 5] Numerous studies have demonstrated high levels of testing and the yield of new HIV diagnoses from emergency department (ED) screening programs, [6–12] but few have examined routine HIV screening among hospital inpatients[13–15] and none have involved whole communities.

The HIV Prevention Trials Network (HPTN) 065 study was conceived to evaluate the feasibility of an enhanced community-level test and link to care plus treat strategy in the United States. The study included several components designed to expand HIV testing, to evaluate the effectiveness of financial incentives for linkage to care and viral suppression and a computer-based prevention intervention for HIV-positive persons in care, and surveys of providers and patients to assess attitudes about antiretroviral therapy for prevention.[16–18] We describe here the expanded hospital testing component, which sought to achieve the universal offer of HIV testing during ED visits and inpatient admissions.

Methods

Study facilities

Two communities, the Bronx, New York (Bronx) and Washington, DC (DC), were selected for participation in HPTN 065 because of their high estimated HIV prevalence (1.7% and 2.3%, respectively) and existence of initiatives instituted by the cities' health departments to increase HIV testing and linkage to care.[19–21] Sixteen hospitals (9 in the Bronx, NY and 7 in DC) agreed to participate. In DC, one hospital did not undertake ED testing and one did not conduct inpatient testing. All but 2 hospitals (one Veterans Administration facility in

each community) received some health department funding to support HIV testing before and during the 3-year study period.

Intervention

The study was an uncontrolled prospective observational evaluation of hospital-level interventions to encourage staff to offer HIV testing to all ED patients and inpatients as part of usual clinical practice, consistent with CDC recommendations.[4]. The study supported a testing coordinator and part-time data manager at each hospital and provided some additional funding that could be used, at the hospital's discretion, for activities to promote HIV screening including the purchase of testing reagents and supplies, support for staff, or other activities related to HIV testing. Testing coordinators and study leaders at each hospital identified approaches to increase testing relevant for their institution. These included fostering administrative and clinical staff support, streamlining informed consent procedures, modifying electronic medical records to identify patients who had not been tested and developing prompts to encourage the order of HIV tests, incorporating HIV testing as part of routine admission orders, and shifting from point-of-care rapid testing by dedicated staff to centralized, high volume, fast-turnaround testing in the hospital laboratory. An important part of the strategy was to identify "champions" in key leadership roles who could promote the testing effort. Hospitals established their own testing goals and reported aggregate testing data monthly to a centralized database, and each participated in periodic study-specific conference calls to monitor progress, discuss challenges, and provide feedback.

Data completeness

The study relied on the hospitals' usual reporting mechanisms for data collection. Most facilities provided a fairly complete record of HIV tests, some recorded manually. However, few existing systems could record the overall number of HIV tests offered or declined, and some facilities could not provide data for all months throughout the study period on the number of ED or inpatient admissions or the number of positive tests that represented new HIV diagnoses. Therefore, we excluded monthly observations from facilities for those months with incomplete data for the calculation of percentages of HIV tests, positive HIV tests, and new diagnoses.

Outcomes

Because information on unique patient visits could not be obtained, the primary endpoint—change in testing from year 1 to year 3 -- was defined in terms of the percentage of ED encounters and inpatient admissions during which an HIV test was conducted. We analyzed data for the number and percentage of annual HIV tests during ED visits and inpatient admissions, the percentages of positive HIV tests and of new HIV diagnoses, defined as those for which there was no previous HIV diagnosis in the medical record or by patient self-report. We also assessed the total number of point-of-care and laboratory-based HIV tests conducted during each year of the study at each facility.

Statistical analysis

The absolute difference from year 1 to year 3 in the percentage of ED visits and inpatient admissions during which an HIV test was conducted was computed for each hospital and compared, using a z-test, to an absolute change of five percentage points. Facilities with a significant increase in testing of at least five percentage points were considered to have meaningfully improved HIV testing, and facilities with a significant decrease of at least five percentage points were considered to have meaningfully worsened. Facilities with less than a five percentage point change in testing (increase or decrease) were classified as no meaningful change. Analyses were performed using SAS software version 9.3 (SAS Institute Inc., Cary, NC, USA).

Ethical review

Because hospital HIV testing was already being conducted as public health practice for the benefit of individuals in the two communities, no additional intervention with patients was planned, and no personally identifying or study-specific information was collected, this component of the HPTN 065 protocol was deemed to be non-research by each site's affiliated institutional review board.

Results

From February 2011 through January 2014, there were 1,621,016 ED visits and 361,745 inpatient admissions in the Bronx and 729,172 ED visits and 150,655 inpatient admissions in DC (Table 1). Of 324 total study months in the Bronx (36 months at 9 hospitals), ED data were complete, but 16 months (4.9%) of inpatient data were missing for new diagnoses. Of 252 total study months in DC (36 months at 7 hospitals), 9 months (3.7%) of ED data were missing for percentages of HIV tests, positive tests, and new diagnoses; for inpatient admissions, 48 months (19.0%) of data were missing for percentages of HIV tests and positive tests, and 84 months (33.3%) of data were missing for new diagnoses.

HIV testing in the EDs

HIV tests were conducted during 6.5% (106,176) of ED visits in the Bronx hospitals and 13.8% (100,805) of ED visits in the DC hospitals (Table 1), but testing varied widely by hospital. In the 9 Bronx hospitals, the total number of HIV tests per hospital ED during the 3-year period ranged from 527 to 27,743, and the proportion of ED visits with an HIV test ranged from 2.0% to 12.5% (Supplementary Table 1). Among the 7 DC hospitals, the total number of HIV tests per hospital ED ranged from 2,916 to 27,160 and the proportion tested ranged from 4.8% to 39.3%. (Supplementary Table 2).

The percentage of ED visits with HIV testing showed little overall change from year 1 to year 3 in the Bronx hospitals (6.6% to 6.9%), but increased from 11.9% to 15.8% in the DC hospitals (Table 1). At individual hospitals in both the Bronx and DC, the change in the absolute percentage of ED visits with HIV testing over the 3 years showed a wide range (Figure 1). Over the study period, 3 EDs experienced a meaningful (>5%) increase in the absolute percentage of HIV tests, 3 experienced a meaningful decrease in the absolute percentage of tests, and 10 EDs showed little change (Figure 1).

HIV testing among inpatient admissions

In Bronx hospitals overall, HIV tests were conducted during 13.0% (47,086) of inpatient admissions, and in DC, during 22% (33,129) (Table 1). The proportion of inpatient admission HIV tests ranged widely at individual hospitals, from 5.1% to 26.8% in the Bronx (Supplementary Table 1) and from 9.6% to 49.1% in DC (Supplementary Table 2). There was little change in the annual percentage of inpatient admissions with HIV testing in the Bronx hospitals (13.0% in year 1, 13.6% in year 3) but a small increase in DC, from 19.0% in year 1 to 23.9% in year 3 (Table 1). Similar to ED testing, the absolute change from year 1 to year 3 in the percentage of tests ranged widely (Figure 1). Four hospitals experienced meaningful increases in inpatient admission HIV testing from year 1 to year 3, and only one hospital experienced a meaningful decrease.

Positive HIV tests

The overall percentage of HIV-positive tests was higher among inpatient admissions than among ED visits in both cities: 1.8% of inpatient tests versus 0.4% of ED tests in the Bronx, and 4.9% of inpatient tests versus 0.6% of ED tests in DC (Table 1), but many of these were from previously diagnosed patients (Table 2). The percentage of positive ED HIV tests remained stable at 0.4% over the three study years in the Bronx, but increased slightly from 0.6% in year 1 to 0.8% in year 3 in DC, while the percentage of positive inpatient admission HIV tests increased slightly in Bronx hospitals but decreased in DC (Table 1).

New HIV diagnoses

Analyses were restricted to the subset of HIV testing data for which information on new diagnoses was complete (Table 2). The overall prevalence of undiagnosed HIV among persons tested was lower in EDs (0.3% in the Bronx, 0.4% in DC) than among inpatients (0.5% in the Bronx and 0.7% in DC). However, more positive tests in the ED represented new HIV diagnoses in both communities (67.9% in the Bronx; 65.4% in DC) than positive tests among inpatient admissions (29.1% in the Bronx; 14.0% in DC). The percentages of positive tests that were new diagnoses decreased from year 1 to year 3 in both cities, for both ED tests and inpatient admission tests.

Laboratory-based testing

The percentage of all ED HIV tests that were conducted in the laboratory increased over the course of the study in both cities. In the Bronx, despite four hospitals that did not perform any laboratory-based tests on ED patients during the study, there was an overall 19.6 percentage point increase in laboratory-based testing, from 0.3% in year 1 to 19.9% in year 3 (Supplementary Table 1). In DC, the percentage of ED HIV tests that were performed in the laboratory increased from 0.3% in year 1 to 24.5% in year 3 (Supplementary Table 2). Among Bronx inpatient admissions, laboratory-based testing increased from 28.8% in year 1 to 55.8% in year 3 (Supplementary Table 1). The percentage of inpatient admission HIV tests conducted in the laboratory in DC was high at the start of the study (97.3%) but declined to 87.0% overall in year 3 due to large reductions in laboratory testing at two sites (Supplementary Table 2).

Discussion

The HPTN 065 study sought to promote the universal offer of HIV testing during ED visits and inpatient admissions at participating hospitals in the Bronx, NY and Washington, DC. During 2,350,188 ED visits and 512,400 inpatient admissions, more than 280,000 HIV tests were conducted. Despite concerted efforts to increase testing, HIV tests were performed during fewer than 25% of all ED visits and inpatient admissions. However, the number of HIV tests performed and the percentage of visits and admissions with an HIV test varied widely among the hospitals. Over the 3-year study period, the percentage of encounters during which an HIV test was conducted showed only small increases in DC and little change in the Bronx. Consistent with numerous previous studies (summarized in [12]), hospitals in both communities successfully conducted HIV screening and consistently identified previously undiagnosed HIV infections, but were unable to perform testing during the majority of encounters. However, because many persons make repeated visits to the ED, consistently screening even a relatively modest number of patients for HIV over time can have important cumulative effects on increasing the overall proportion of persons who have been tested and newly diagnosed.[22]

Participating hospitals attempted to implement different operational changes that have been shown to increase HIV testing, such as eliminating written consent, integrating the offer of HIV screening into the triage or intake process, automating identification of patients who should be tested, and real-time electronic reminders and clinical decision support tools.[22–26] Optimizing such processes can also reduce the cost of HIV screening programs.[27] However, the necessary modifications often required engagement and approval at several administrative levels, vied with other priorities for attention, and could be time-consuming and resource intensive. At several facilities, because of practical and logistical challenges, procedural changes proposed early in the study period were not adopted before the study ended, which might explain why only 7 of the 16 hospitals were able to meaningfully increase HIV testing during ED visits or inpatient admissions despite having identified champions and the funding, albeit limited, provided by the study.

Hospitals were encouraged to use routine laboratory-based HIV tests for screening because they facilitate testing larger numbers of patients and were better at identifying acute infections that would be missed by point-of-care antibody tests.[10, 11, 28–30] At the two hospitals in the Bronx and the two in DC that successfully adopted centralized laboratory HIV testing during the study, the annual number of tests conducted during ED visits more than doubled. However, in most participating hospitals, point-of-care rapid HIV tests constituted the majority of tests performed during the study period. In some hospitals, obstacles such as lead-times for acquiring new laboratory equipment or existing purchasing contracts prevented changes to testing procedures. Hospitals also might have had less motivation to change from point-of-care testing because health departments provided support for testing personnel and free rapid HIV tests before and throughout the 3-year study period.

Recommendations and regulations surrounding HIV testing might also have affected hospital testing practices. CDC has recommended routine HIV screening in health care

settings since 2006, [4] but the U.S. Preventive Services Task Force did not endorse routine testing of all persons, not just those deemed at increased risk, until April 2013, during the last year of the study.[5, 31] New York State passed a statute in 2010 that required health care providers to offer HIV testing to persons aged 13–64 in hospitals, emergency departments, and primary care settings, but the mandate had only a modest effect on the odds of HIV testing.[32] Until 2014, New York State required written informed consent for HIV tests, which providers frequently cite as a major impediment to routine HIV testing.[33, 34] This might explain why HIV testing showed small increases in DC, a municipality that did not require written consent, in contrast to the Bronx.

The study had several limitations. First, it relied on data collected during the delivery of clinical services, which proved to be incomplete for key outcomes. Testing could be offered by different staff members at different times, and the various information systems at participating hospitals could not collect information on the number of HIV tests that were offered or declined by diverse people in various settings.

Second, although the protocol sought to achieve universal offer of testing, staff were encouraged to follow current recommendations, with the more pragmatic goal of HIV testing persons who had not been tested previously and those at increased risk.[4, 5] Specific data are not available from the participating institutions, but the Behavioral Risk Factor Surveillance System suggests that it is likely many individuals who made ED visits or had inpatient admissions had already been tested: in 2011, 50% of persons aged 18–65 in New York State and 73% in Washington, DC reported that they had been tested for HIV at least once.[35] Third, the percentages tested for HIV were based on the numbers of visits or admissions, not unique patients. Specific utilization data are not available for the study hospitals, but other studies suggest that frequent users account for up to 28% of ED visits.[36] Thus, the percentage of ED visits during which an HIV test was conducted is likely to underestimate considerably the percentage of unique, eligible (previously untested) patients who were tested. A fourth limitation is the lack of access, at the time of offer of testing at these institutions, to historical testing information, which resulted in repeat testing of persons who had tested HIV-positive before. The study found that one-third of positive ED tests and 80% of positive inpatient tests were obtained from persons who had a previous HIV diagnosis. Notwithstanding, repeat testing for those with a prior HIV-positive test is not without benefit. Other routine HIV testing programs have demonstrated that when previously diagnosed patients undergo repeat testing in the context of a screening program, engagement in HIV care and viral suppression improve after retesting, regardless of the number of years since initial diagnosis.[37, 38]

Conclusion

In the HPTN 065 study, during the 3-year effort to increase hospital testing in the Bronx and DC, the percentage of ED visits and inpatient admissions during which an HIV test was conducted showed only modest change. However, large-scale facility-based HIV testing was feasible, and focusing testing efforts on those with no record of HIV testing appears to be warranted. In both communities, the prevalence of new HIV diagnoses among those screened exceeded the 0.1% threshold at which, based on cost-effectiveness, CDC

recommends routine HIV screening in health care settings.[4] Opportunities remain to expand HIV testing in both ED and inpatient settings, but will require additional strategies and resources to fully realize its potential.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Summary

The expanded hospital testing component of HPTN 065 examined the feasibility of universally offering HIV testing to emergency department and hospital admissions community-wide in the Bronx, New York and Washington, DC. All hospitals offered HIV testing and identified new HIV diagnoses, but none achieved universal coverage.

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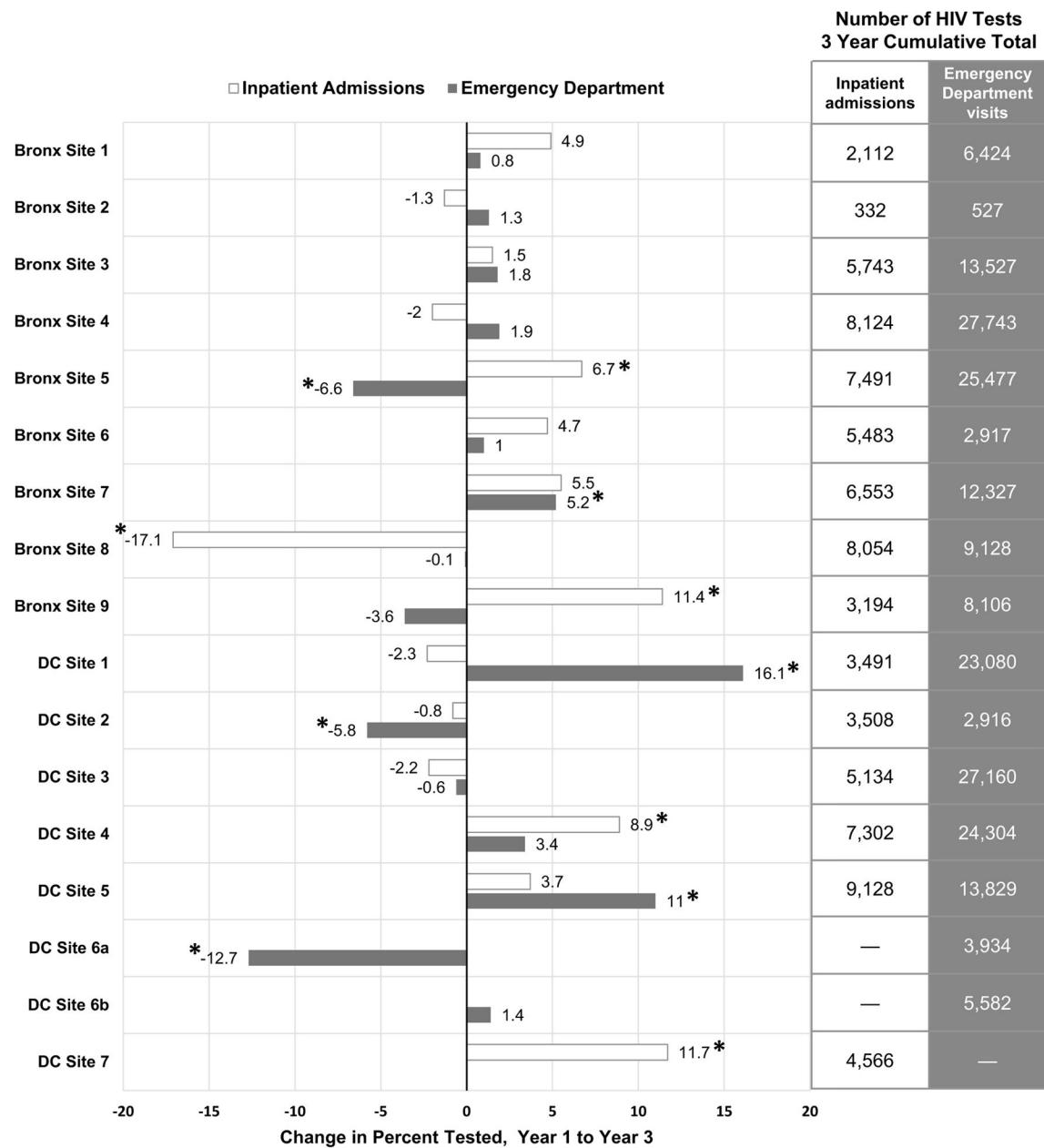


Figure. Absolute difference from year 1 to year 3 in the percentage of tests conducted during ED visits and IP admissions, by hospital, 2011–2014

* Denotes significant change in percent tested of $\geq 5\%$

Table 1

HIV Tests conducted during emergency department visits and inpatient admissions, by community and study year

Year	Bronx, NY					Washington DC				
	Emergency Department HIV Tests					Emergency Department HIV Tests				
	Visits N	HIV Tests N (% of visits)	Positive HIV Tests N (% of HIV Tests)	Visits N	HIV Tests N (% of visits)	Positive HIV Tests N (% of HIV Tests)	Visits N	HIV Tests N (% of visits)	Positive HIV Tests N (% of HIV Tests)	Visits N
2/2011–1/2012	525,137	34,620 (6.6)	153 (0.4)	233,767	27,860 (11.9)	172 (0.6)				
2/2012–1/2013	555,113	34,166 (6.2)	122 (0.4)	264,337	36,449 (13.8)	161 (0.4)				
2/2013–1/2014	540,766	37,390 (6.9)	133 (0.4)	231,068	36,496 (15.8)	285 (0.8)				
Overall	1,621,016	106,176 (6.5)	408 (0.4)	729,172	100,805 (13.8)	618 (0.6)				
Year	Inpatient HIV Tests					Inpatient HIV Tests				
	Admissions N	HIV Tests N (% of admissions)	Positive HIV Tests N (% of HIV Tests)	Admissions N	HIV Tests N (% of admissions)	Positive HIV Tests N (% of HIV Tests)	Admissions N	HIV Tests N (% of admissions)	Positive HIV Tests N (% of HIV Tests)	Admissions N
	Admissions N	HIV Tests N (% of admissions)	Positive HIV Tests N (% of HIV Tests)	Admissions N	HIV Tests N (% of admissions)	Positive HIV Tests N (% of HIV Tests)	Admissions N	HIV Tests N (% of admissions)	Positive HIV Tests N (% of HIV Tests)	Admissions N
2/2011–1/2012	122,021	15,811 (13.0)	230 (1.5)	42,758	8,133 (19.0)	519 (6.4)				
2/2012–1/2013	120,900	15,112 (12.5)	251 (1.7)	54,668	12,294 (22.5)	561 (4.6)				
2/2013–1/2014	118,824	16,163 (13.6)	366 (2.3)	53,229	12,702 (23.9)	540 (4.3)				
Overall	361,745	47,086 (13.0)	847 (1.8)	150,655	33,129 (22.0)	1,620 (4.9)				

Excludes monthly observations from hospitals for months with missing values for any data needed to calculate percent of visits or percent of HIV tests.

Table 2

Percentage of positive HIV tests and new HIV diagnoses in emergency department visits and inpatient admissions, by community and study year

		Bronx, NY				Washington DC			
		New Diagnoses				New Diagnoses			
Emergency departments	HIV Tests N	Positive HIV Tests N (% of HIV Tests)	% of HIV Tests	% of Positive HIV Tests	HIV Tests N	Positive HIV Tests N (% of HIV Tests)	% of HIV Tests	% of Positive HIV Tests	
2/2011–1/2012	34,620	153 (0.4)	0.34	77.8	27,860	172 (0.6)	0.48	77.3	
2/2012–1/2013	34,166	122 (0.4)	0.25	70.5	36,449	161 (0.4)	0.33	75.2	
2/2013–1/2014	37,390	133 (0.4)	0.19	54.1	36,496	285 (0.8)	0.41	52.6	
Overall	106,176	408 (0.4)	0.26	67.9	100,805	618 (0.6)	0.40	65.4	
		New Diagnoses				New Diagnoses			
Inpatient admissions	HIV Tests N	Positive HIV Tests N (% of HIV Tests)	% of HIV Tests	% of Positive HIV Tests	HIV Tests N	Positive HIV Tests N (% of HIV Tests)	% of HIV Tests	% of Positive HIV Tests	
2/2011–1/2012	14,909	211 (1.4)	0.53	37.0	6,396	414 (6.5)	1.50	22.0	
2/2012–1/2013	15,112	251 (1.7)	0.62	36.7	10,659	467 (4.4)	0.50	10.9	
2/2013–1/2014	16,163	366 (2.3)	0.45	19.4	10,940	468 (4.3)	0.45	10.0	
Overall	46,184	828 (1.8)	0.53	29.1	27,995	1,349 (4.8)	0.70	14.0	

Excludes monthly observations from hospitals for months during which any data needed for calculation of percentage of new diagnoses are missing.