

HIV/AIDS CLINICAL CARE QUALITY ASSURANCE PROJECT

**Trends in Clinical Performance & Clinical Outcomes at
All Reviewed Boston Public Health Commission Funded Ryan White Part A Clinics**

2001 to 2006



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BACKGROUND

Since 2002, JSI has conducted biannual reviews of HIV/AIDS primary medical care provided in 10 Boston EMA Part A sites for a clinical care quality assurance project funded by the Boston Public Health Commission (BPHC). The purpose of this project is to evaluate performance in HIV clinical services and to identify opportunities for improving care and health outcomes for people living with HIV/AIDS.

Three cycles of review have been completed and seven years of data are available (2000 to 2006) for each participating site (Appendix A). Our sample includes the original cohort of a random set of patients reviewed since 2000, patients newly entering care at the sites in 2001 and 2002, and patients newly diagnosed with HIV and entering care between 2003 and 2006.

Data elements and methods used in this project were adopted from a data collection strategy initially developed by JSI for the Massachusetts Department of Public Health ACT Now Program.

JSI nurses and trained research assistants performed detailed medical chart reviews on a random sample of all active patients at each site (all patients were reviewed at sites with smaller HIV caseloads). In more recent years, many clinics have converted to electronic medical records and thus both paper and electronic sources were used to ensure the fullest data capture.

EVALUATION METHODOLOGY

The current report summarizes clinical performance and outcome measures that are emphasized by the Health Resources and Services Administration-HIV/AIDS Bureau (HRSA-HAB) and focuses on prevention, screening, and treatment services in HIV clinical care management.

With six annual years of data (2001 to 2006), we highlight the aggregate clinical performance of all BPHC sites reviewed. Using established national treatment guidelines and IHI and HRSA benchmarks where available, we present aggregate site changes in performance and outcome measures from 2001 to 2006. Clinical performance indicators include provider visits, antiretroviral treatment, PCP prophylaxis, CD4 counts, and viral hepatitis screening. Outcome measures include viral load suppression, CD4 counts, and all cause hospitalizations.

We also present clinical performance and outcome data based on patient demographics including gender, foreign born vs. US born, and race and ethnicity, to identify potential opportunities for improving care. Chi-square analyses were used to test for statistical significance. Further, for select clinical and outcome indicators, we display data for each of the BPHC sites reviewed as well as data for the aggregate sample to illustrate potential variations across the sites.

To test for statistically significant differences across sites, we calculated 95% confidence intervals (CI) for the aggregate mean proportion of select indicators for years 2005 and 2006. Individual sites may use the 95% CI to evaluate their performance relative to aggregate sites' performance. Estimates within the bounds of the 95% confidence interval are not statistically significant and sites are assumed to be performing on par with all BPHC sites. Sites with

estimates that lie below the lower bound of the 95% CI have significantly lower performance than all sites combined. Similarly, sites with estimates that are above the upper bound of the 95% CI have significantly higher performance than all BPHC sites on a given indicator. The following formula was used for calculating 95%CI:

$$95\% \text{ CI: } p \pm 1.96 * \sqrt{(p * (1-p)) / n}$$

Where p = Aggregate mean proportion and n = aggregate sample size

Due to sample size constraints, sites with smaller caseloads or those with fewer than 25 patients reviewed were excluded. Based on this criterion, two sites are not displayed on the 95% CI charts.

POTENTIAL LIMITATIONS

As with any medical chart review project, the validity of findings depends on the clarity, accuracy, and completeness of data maintained in patient records. Differences in documentation procedures across clinics and among providers may affect results. Referrals to other providers or care received elsewhere including hospitalizations that are not systematically documented in patient medical records may lead to an underestimate of services provided. Further, results may also be underestimated if there were incomplete documentation or incomplete data transfers during the conversion period to electronic medical records at some sites.

While patients were randomly selected for observation during the first review cycle, oversampling of patients newly diagnosed with HIV in recent years may have reduced the overall generalizability of results presented.

Data presented for the various demographic subgroups were tested for statistical significance using chi-square analysis. While differences in certain clinical performance and outcome indicators were observed among various demographic subgroups in some years, findings should be interpreted with caution as these differences may be attributable to other potential confounding factors. Therefore, even statistical significant differences may not reflect actual disparities in care and further investigation is warranted prior to making conclusions about these trends.

Finally, due to the variability in sample sizes across individual sites, due caution should be exercised when making site to site comparisons.

REPORT OUTLINE

This report summarizes:

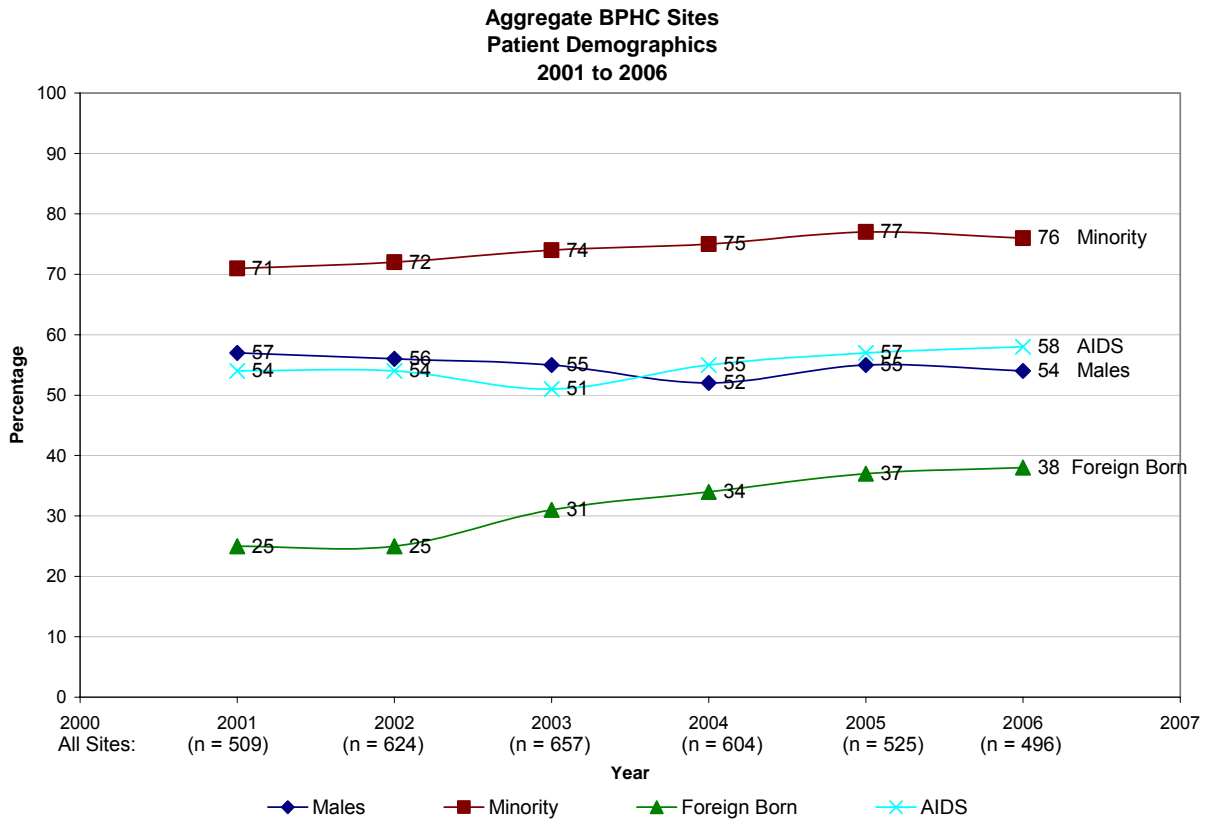
- 1) Trends or changes in patient demography across all Boston Public Health Commission sites reviewed from 2001 to 2006.
- 2) Annual data on select clinical performance measures from 2001 to 2006 for all patients diagnosed on or before December 31, 2005, who were alive with at least 2 visits at the end of a given review year.
 - Aggregate BPHC sites' clinical performance between 2001 and 2006
 - Aggregate BPHC sites' clinical performance between 2001 and 2006 by select demographic subgroups (gender, place of birth: foreign born vs. US born, and race/ethnicity) with p-values where statistically significant
 - Comparisons among sites and aggregate BPHC sites: 95% CI
- 3) Annual data on select outcome measures including viral load, CD4 count, and all-cause hospitalizations
 - Outcome measures for aggregate BPHC sites between 2001 and 2006 by select demographic subgroups (gender, place of birth: foreign born vs. US born, race/ethnicity) with p-values where statistically significant
 - Comparisons among sites and aggregate BPHC sites: 95% CI

Data presented include all patients reviewed who were diagnosed on or before December 31, 2005, alive at the end of the year, with at least 2 visits during the review year.

In order to preserve anonymity, site names and site-specific sample sizes are not revealed. Sites were arbitrarily assigned letter codes and were categorized by size of caseload (number of patients sampled and or included in this analysis). Please refer to category definitions on page 9 or Appendix B.

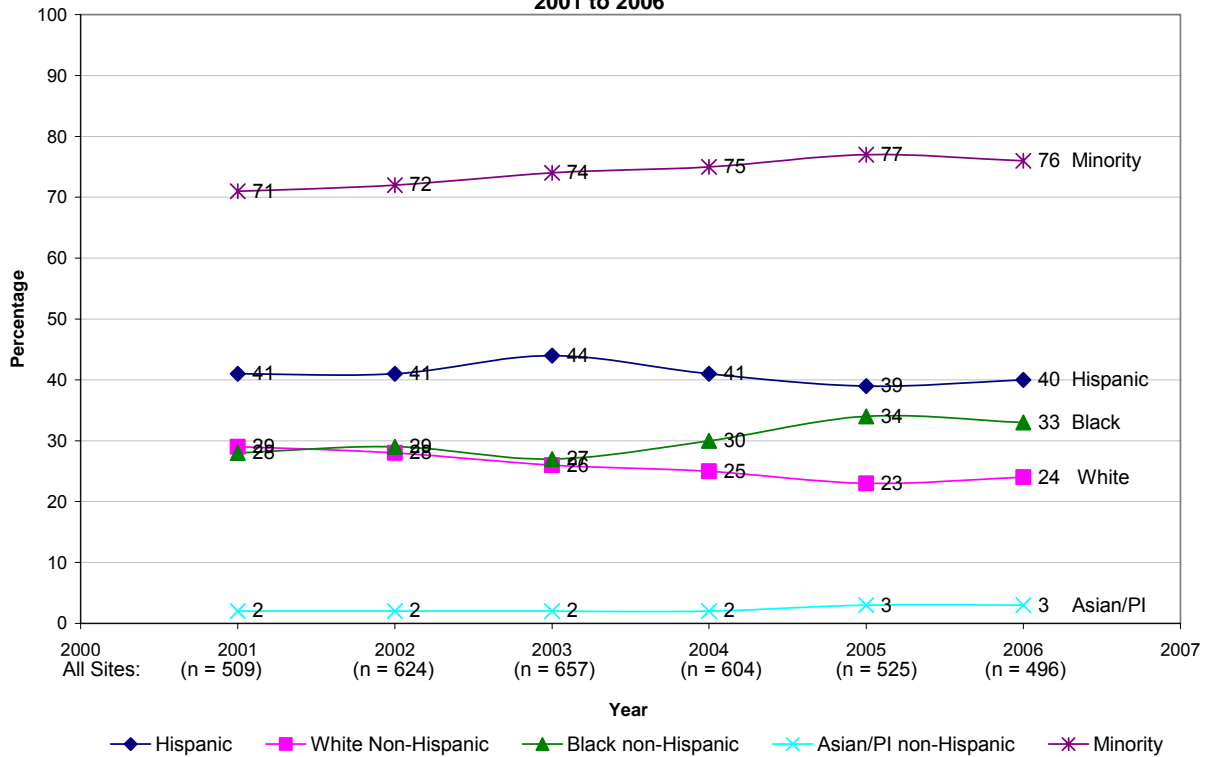
PART I. PATIENT CHARACTERISTICS

Boston EMA Part A sites serve diverse patient populations that are traditionally disenfranchised and underserved. Thus, it is important to continuously monitor and recognize demographic trends for the planning and delivery of HIV clinical care to ensure that services and interventions are culturally and linguistically appropriate to changing client needs. Data on patient demographics including gender, age, race/ethnicity, nativity (foreign-born vs. US born), and HIV risk factors were collected. The figure below highlights the characteristics of all patients sampled at BPHC sites from 2001 to 2006.



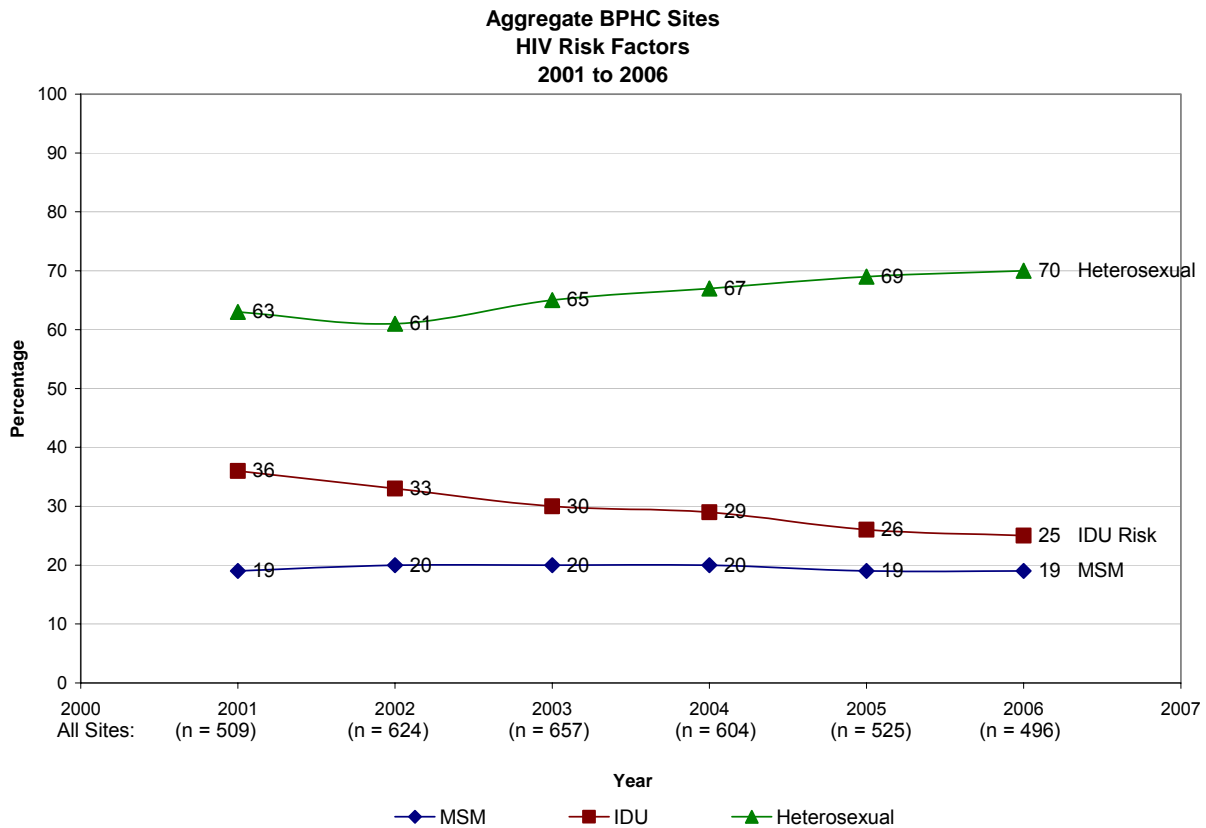
Consistently about 75% of all patients sampled at Boston Public Health Commission funded sites were racial or ethnic minorities throughout the 6 year review period. However, we did observe a gradual increase in the proportion of foreign born patients, from 25% in 2001 to 38% in 2006. Males represented about 55% of the patients sampled and a fairly constant 55% of patients had an AIDS-defining condition from 2001 to 2006.

**Aggregate BPHC Sites
Patient Race-Ethnicity
2001 to 2006**



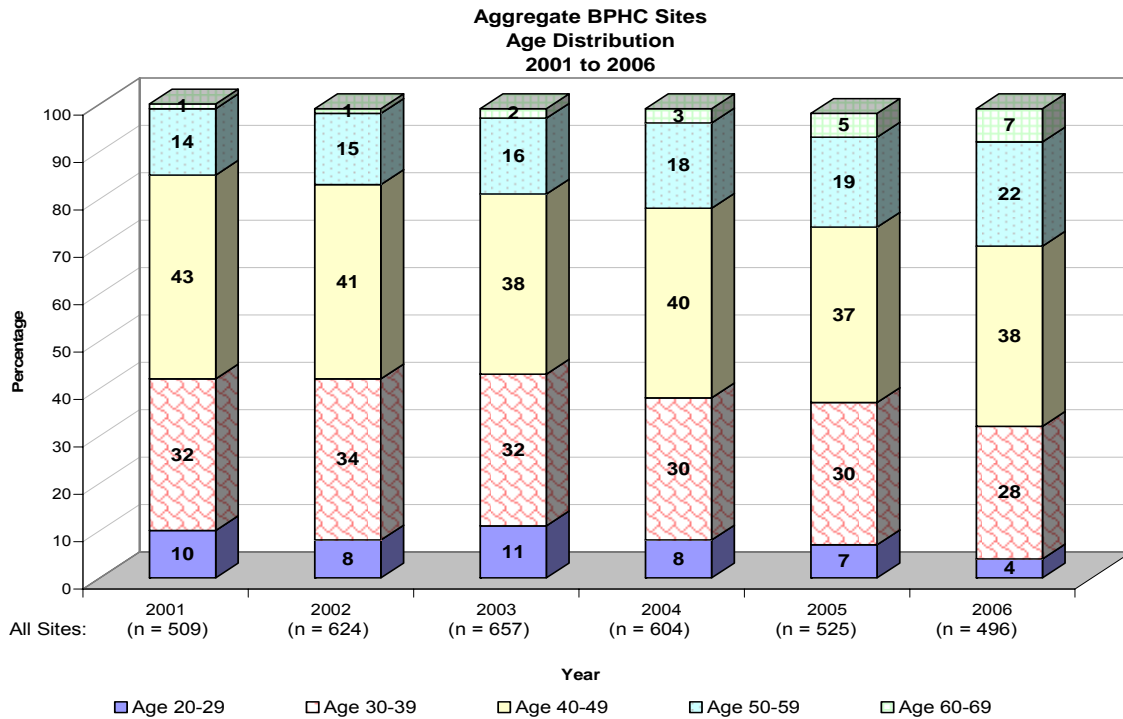
Among racial or ethnic minorities, Hispanic patients made up approximately 40% of the patients sampled at BPHC sites throughout the 6 review years. A slight increase in the proportion of Black non-Hispanics patients was observed, with roughly 28% from 2001 to 2003 to about 33% in 2006. Two to 3% were Asian or Pacific Islanders.

Patient factors such as intravenous drug use and presumed HIV exposure risk (MSM/heterosexual) were also examined during the chart review process. Patients may be categorized in more than one risk group due to multiple transmission factors, and thus percentages may add to more than 100%.



Throughout the 6 review years, a constant 19% of patients sampled at all BPHC sites had MSM as a documented HIV risk factor. A slight increase was observed in the proportion of patients with heterosexual transmission risk, from 63% in 2001 to 70% in 2006. Further, the proportion of patients with documented IDU risk decreased from 36% in 2001 to 25% in 2006.

AGE DISTRIBUTION



As a group, the proportion of patients between 50-59 and 60-60 nearly doubled from 2001 to 2006. In 2001, patients ages 50 and over represented only 15% of the patient sample and by 2006, almost 30% of patients were between the ages 50 and 69. At the same time, we observed small declines in the proportion of patients ages 30 to 39 and 40 to 49. In 2006, 38% were between the ages of 40 and 49, compared to 43% in 2001. Likewise, a smaller 28% of patients were ages 30 to 39 in 2006, compared to 32% in 2001. Four percent of patients were ages 20-29 in 2006.

Table 1. Mean Age of Patients Sampled at All Reviewed BPHC Funded Sites, 2001 to 2006

	2001	2002	2003	2004	2005	2006
Total Sample Size	N=509	N=624	N=657	N=604	N=524	N=496
Mean Age in Years	41.5	41.5	41.6	42.5	43.6	44.9
Continuing Cohort (n)	41.5 (502)	42.5 (482)	42.5 (520)	42.6 (595)	43.7 (481)	44.9 (496)
New Patients (n)	37.3 (7)	38.0 (142)	38.0 (137)	36.7 (9)	42.1 (44)	-
Standard Deviation	8.2	8.8	9.2	9.2	9.5	9.6
Age Range	20-72	14-79	20-74	21-78	17-76	18-77

Note: Patients newly diagnosed in 2006 were excluded from the analysis for this report since they may not necessarily have been in care long enough to meet the performance standards.

In 2006, the mean age of patients in the continuing cohort was 45 years old, compared to a mean of 42 years in 2001. Patients newly entering into care or newly diagnosed tended to be younger than patients in the continuing cohort in all years.

AGGREGATE & SITE-SPECIFIC SAMPLE SIZE 2001 TO 2006

The table below provides the aggregate sample included in the analysis for this report as well as the site-specific sample sizes for each year reviewed from 2001 to 2006. Only patients reviewed who were diagnosed on or before December 31, 2005, alive at the end of the year, with at least 2 visits during the review year were included in the analysis.

Table 2. Aggregate Sample Size & Site-Specific Caseload Category

	2001	2002	2003	2004	2005	2006
Aggregate Sample Size	509	624	657	604	525	496
Site-Specific Sample Size						
Clinic A						L
Clinic B						L
Clinic C						M
Clinic D						M
Clinic E						M
Clinic F						M
Clinic G						L
Clinic H						S
Clinic I						S

*For certain clinical or outcome indicators presented in this report, a smaller number or a subset of the patient sample were used as the denominator. For example, a subset of patients or only those patients who were on ART at last visit were included in the denominator for the clinical indicator “last viral load ≤ 400 .”

Site names and site-specific sample sizes are not included to preserve anonymity. Instead, sites are arbitrarily assigned a letter code and are categorized by size of caseload as follows:

*Small (S) = ≤ 25 patients
 Medium (M) = 26-75 patients
 Large (L) = > 75 patients*

THIS TABLE IS ALSO PROVIDED IN APPENDIX B

PART II. CLINICAL PERFORMANCE INDICATORS

For all patients in the original cohort and newly diagnosed patients, JSI collected data for each review year on the following process indicators that correspond with HRSA's HAB HIV Tier 1 Clinical Performance Measures:¹

- Visit with an HIV provider every trimester (4-month periods of Jan-Apr, May-Aug, and Sept-Dec)
- Immune function monitoring: CD4 counts
- PCP prophylaxis for patients with CD4 cell count < 200 cells/mm³
- ART Management
 - On ART when patient met CD4 count or viral load eligibility criteria current during the year of review
- Pregnant women with HIV on ART

Other measures collected that will also be presented in this section include:

- Hepatitis Screening and vaccination:
 - Receipt of at least one dose of Hepatitis A vaccine if HAV antibody negative
 - Receipt of at least one dose of Hepatitis B vaccine if no evidence of prior hepatitis B infection (defined as any test for HBV antibody or antigen negative)
 - Hepatitis C treatment (of potential candidates)
- Pneumovax ever administered
- Cervical cancer screening
 - Annual Pap smears (women)
 - Pap smear results
 - Referrals for management of abnormal Pap smears

Additionally, we provide data on select performance indicators by demographic subgroups (gender, place of birth, race or ethnicity) to identify potential opportunities for improving care. Furthermore, for certain indicators, we display a listing of each site's performance in relation to the aggregate performance. Due to differences in the number of patients sampled at individual clinics, however, some caution must be exercised when making comparisons across sites.

Data presented include all patients reviewed who were diagnosed on or before December 31, 2005, alive at the end of the year, with at least 2 visits during the review year.

¹ HAB HIV Measures... <ftp://ftp.hrsa.gov/hab/1stTierPMs.pdf>

A. CLINICAL PERFORMANCE MEASURES
Aggregate BPHC Sites Reviewed & By Select Demographic Sub-Groups

MEDICAL VISITS

Medical visits with an HIV care provider with prescribing privileges are necessary for management of HIV disease and monitoring of clinical status via routine laboratory work. Current guidelines continue to recommend a medical visit every 3-4 months. In 2007, HRSA/HIV AIDS Bureau HIV Core Clinical Performance Measures defined the medical visit performance measure as being seen “two or more times at least 3 months apart during the measurement year”. Patients recently diagnosed with HIV and those with complications or disease progression may require more frequent visits.

During our data collection process, we determined whether patients had a visit in each 4-month period (defined as Jan-Apr, May-Aug, Sept-Dec) or “trimester”. Since we did not collect actual dates of visits until this last cycle, for the purpose of measuring site performance on this new HRSA indicator, we considered patients with visits in all three trimesters or any two trimesters as fulfilling the criterion set by HRSA in 2007 as described above.

Table 3. Percentage of Patients with Visits in 2 or more 4-month periods, Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size	n=509	n=624	n=657	n=604	n=525	n=496
Aggregate Sites						
Seen in ≥ TWO 4-month periods	93%	85%	88%	92%	90%	93%
By Gender						
Male	92%	84%	86%	93%	87% (p=0.009)	92% (p=0.10)
Female	92%	87%	88%	93%	95%	96%
By Place of Birth						
U.S. Born	91%	88% (p=0.02)	87%	92% (p=0.06)	90%	94%
Foreign Born	93%	80%	86%	96%	91%	94%
By Race or Ethnicity						
Minority	92%	84% (p=0.04)	87%	93%	89%	94%
White non-Hispanic	92%	90%	86%	95%	93%	93%
Hispanic	92%	86% (p=0.001)	85%	93%	91%	96%
Black non-Hispanic	91%	82%	88%	92%	87%	92%
Asian/PI non-Hispanic	100%	79%	100%	93%	100%	100%
Other non-Hispanic	100%	33%	86%	100%	100%	100%

In most years, at least 90% of all patients reviewed at BPHC sites had visits in at least two trimesters with an HIV medical provider with prescribing privileges. From year to year, there appeared to be no trend to suggest any differences by place of birth or race or ethnicity. In 2002

and 2004, the difference by place of birth was statistically significant, though US born were more likely to have regular visits in 2002 and less likely to have regular visits in 2004.

Table 4. Percentage of Patients with Visits in 2 or more 4-month periods, Aggregate & Site-Specific

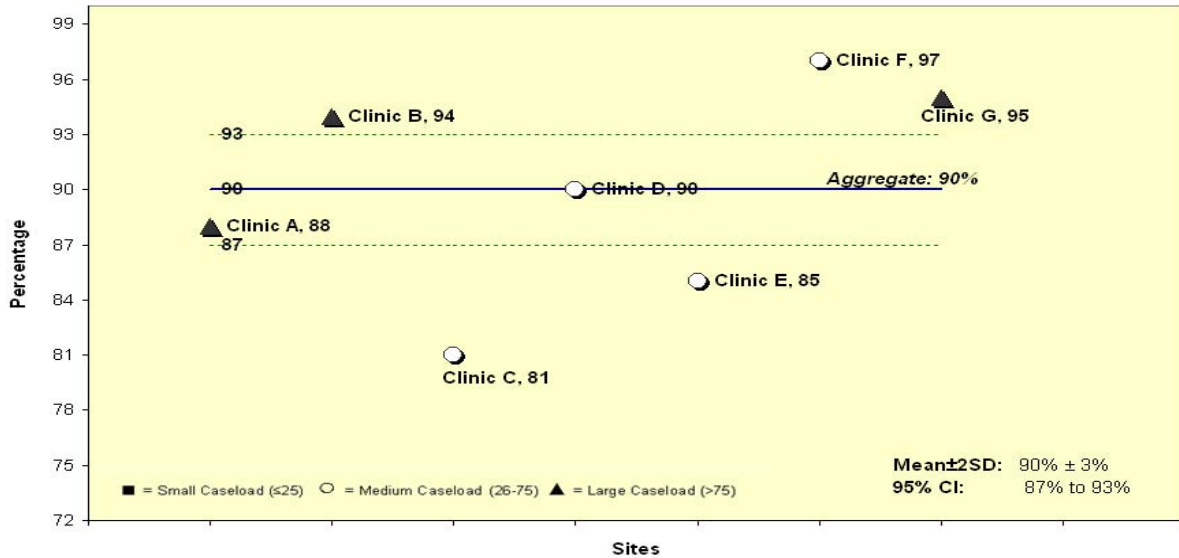
	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=509	n=624	n=657	n=604	n=525	n=496	
Aggregate Sites Seen in ≥ TWO 4-month periods	93%	85%	88%	92%	90%	93%	
By BPHC Site							
Clinic A	86%	82%	88%	94%	88%	92%	L
Clinic B	88%	83%	83%	95%	94%	96%	L
Clinic C	94%	94%	82%	94%	81%	93%	M
Clinic D	94%	95%	88%	97%	90%	96%	M
Clinic E	93%	78%	79%	97%	85%	96%	M
Clinic F	91%	73%	94%	79%	97%	94%	M
Clinic G	95%	93%	93%	92%	95%	95%	L
<i>Clinic H</i>	94%	74%	78%	79%	100%	85%	S
<i>Clinic I</i>	100%	88%	100%	93%	86%	100%	S

Note: For the purposes of anonymity, sample size for each clinic is not provided; rather, each site is categorized as having a small, medium, or large caseload. See Appendix B.

In the table above, we present the percentage of patients with visits with an HIV prescribing provider in two or more trimesters each year by site. Due to the variability in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

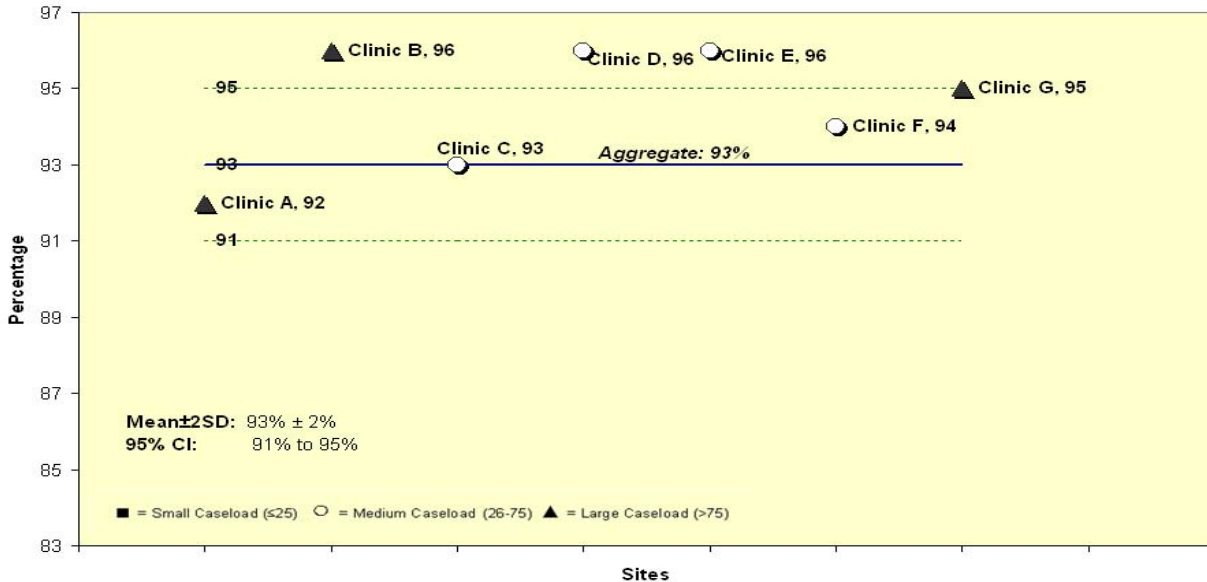
****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

**Patients with Visits in 2 or more 4-month periods
Aggregate & Site Specific
2005**



In 2005, the aggregate mean percentage of patients with medical visits in 2 or more 4-month periods was 90% (95% CI: 87% to 93%). Based on the 95% confidence interval, Clinic C and Clinic E patients tended to have less consistent medical visits with a provider compared to all sites in 2005. Patients at Clinic B, Clinic F, and Clinic G were more likely to have visits in at least two trimesters compared to all sites.

**Patients with Visits in 2 or more 4-month periods
Aggregate & Site Specific
2006**



In 2006, the aggregate mean percentage of patients with medical visits in 2 or more 4-month periods was 93% (95% CI: 91% to 95%). Clinic B, Clinic D, and Clinic E patients were more likely to have consistent medical visits with a provider compared to patients at all sites.

CD4 COUNTS

According to DHHS Guidelines, monitoring of **CD4 counts** is an essential component of quality HIV care. As a measure of immune function, CD4 counts inform treatment decisions including the need for ART initiation, modification, or PCP prophylaxis. CD4 counts are also associated with disease prognosis and survival outcomes. Current US PHS guidelines recommend that CD4 counts be measured at least every three to six months. The 2007 HAB HIV Core Clinical Performance Measure for CD4 counts is 2 or more CD4 counts in a year that are at least 3 months apart (≥ 90 days).

This HRSA/HAB indicator was used for evaluating performance on this measure and is shown in the table below for all BPHC clinics. Patients who were newly enrolled in the last months of the review year were excluded as they would not have been in care long enough to necessarily meet the performance standard. Proportions shown below represent patients meeting this criterion.

Table 5. Percentage of Patients with 2 or more CD4 (≥ 3 months apart), Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size	n=509	n=584	n=607	n=604	n=512	n=496
Aggregate Sites 2 or more CD4s, ≥ 3 months apart	83%	77%	82%	87%	84%	85%
By Gender						
Male	84%	76%	82%	86%	86%	87%
Female	81%	78%	83%	87%	81%	82%
By Place of Birth						
U.S. Born	81%	75% (p=0.02)	79% (p=0.03)	84% (p=0.10)	84%	83%
Foreign Born	88%	82%	88%	90%	85%	89%
By Race or Ethnicity						
Minority	81%	76%	82%	86%	82%	83% (p=0.04)
White non-Hispanic	86%	78%	83%	88%	89%	91%
Hispanic	77%	76%	76%	82%	84% (p=0.02)	80%
Black non-Hispanic	85%	76%	85%	89%	79%	84%
Asian/PI non-Hispanic	100%	92%	100%	93%	93%	92%
Other non-Hispanic	100%	67%	100%	100%	100%	100%

Between 77% and 87% of all patients reviewed at BPHC sites had two or more CD4 counts that were at least 3 months apart from 2001 to 2006. No differences in number of CD4 counts were found by gender. In 3 of the six review years, however, foreign born patients were significantly more likely to have CD4 counts measured regularly than U.S. born patients. In 2005 and 2006, a greater percentage of White non-Hispanics had regular CD4 counts than racial or ethnic minorities.

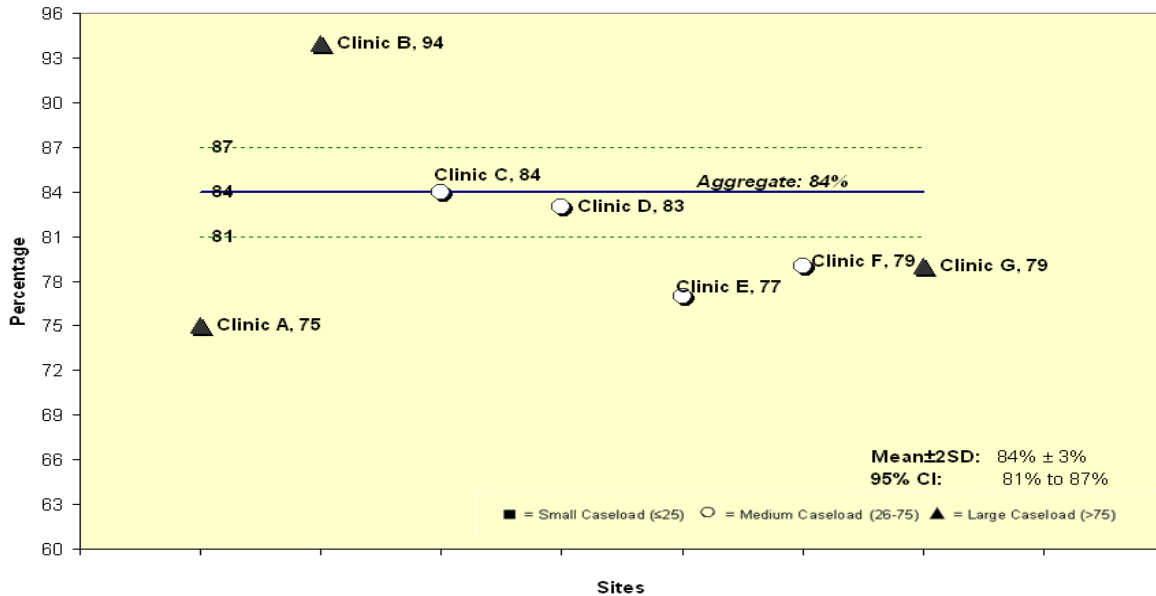
Table 6. Percentage of Patients with 2 or more CD4 (≥ 3 months apart), Aggregate & Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=509	n=584	n=607	n=604	n=512	n=496	
Aggregate Sites 2 or more CD4s, ≥ 3 months apart	83%	77%	82%	87%	84%	85%	
By BPHC Site							
Clinic A	90%	84%	84%	88%	75%	85%	L
Clinic B	96%	78%	86%	90%	94%	93%	L
Clinic C	84%	87%	81%	89%	84%	79%	M
Clinic D	76%	71%	73%	80%	83%	90%	M
Clinic E	78%	70%	76%	96%	77%	83%	M
Clinic F	71%	68%	73%	79%	79%	77%	M
Clinic G	88%	79%	88%	91%	96%	92%	L
<i>Clinic H</i>	60%	56%	66%	68%	90%	65%	S
<i>Clinic I</i>	84%	65%	91%	64%	93%	42%	S

In the table above, we present the percentage of patients with undetectable last viral loads each year by site. Due to variability in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

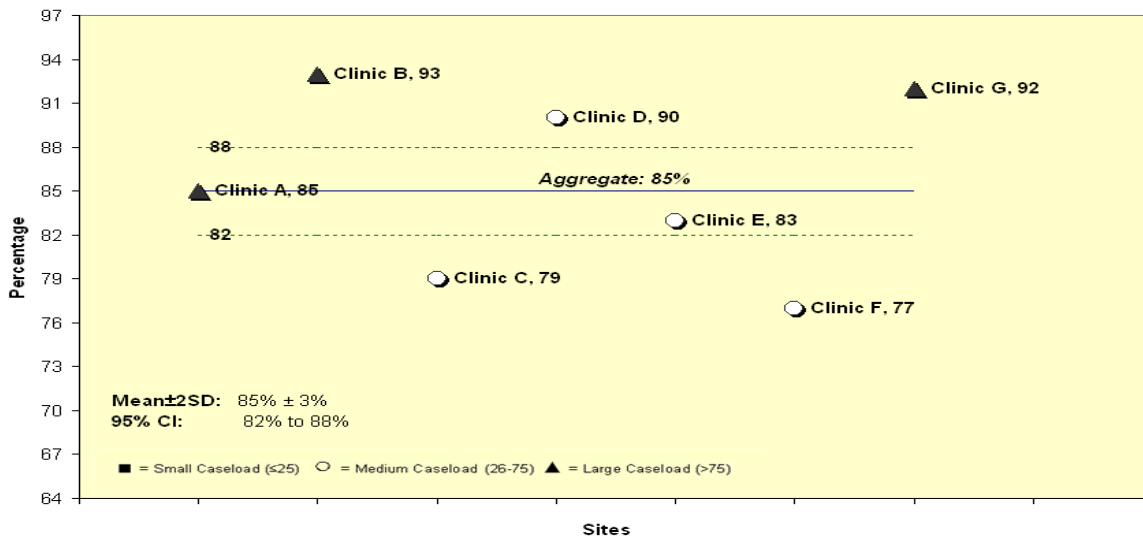
****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

**Percentage of Patients with 2 or more CD4 (≥ 3 months apart)
Aggregate & Site Specific
2005**



In 2005, the aggregate mean percentage of patients with 2 or more CD4 counts that were at least 3 months apart was 84% (95% CI: 81% to 87%). Based on the 95% confidence interval, Clinic B patients were more likely to regular CD4 counts than all patients reviewed in both 2005 and 2006. In 2005, Clinic D and Clinic G patients were also more likely to have 2 or more CD4 counts at least 3 months apart, while Clinic A, E, F, and G patients were less likely to have regular CD4 counts compared to all sites.

**Percentage of Patients with 2 or more CD4 (≥ 3 months apart)
Aggregate & Site Specific
2006**



In 2006, the aggregate mean percentage of patients with 2 or more CD4 counts that were at least 3 months apart was 85% (95% CI: 82% to 88%). In 2006, patients at Clinic G tended to have regular CD4 counts compared to all sites. Patients at Clinic F and Clinic C were less likely to have regular CD4 counts compared to all sites.

PCP PROPHYLAXIS

Pneumocystis jiroveci pneumonia (PCP) is an opportunistic infection that is preventable with appropriate use of **PCP prophylaxis** when indicated. US PHS guidelines state that all patients should receive PCP prophylaxis when CD4 is below 200, percent < 14% or there is prior history of PCP. PCP prophylaxis is included as one of the 2007 HRSA/HAB HIV Clinical performance measures, and the IHI goal is that at least 95% of all patients who meet these criteria be prescribed PCP prophylaxis. Because of potential gaps in documentation of prior OIs or CD4 percent, CD4 count < 200 cells/mm³ for greater than 3 months was set as the criteria for eligibility for PCP prophylaxis. Due to effective ART, the number of patients eligible for PCP was small for individual sites.

Table 7. Percentage of Patients on PCP prophylaxis (among eligible), Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size (PCP prophylaxis eligible)	n=166	n=188	n=190	n=172	n=127	n=118
Aggregate Sites On prophylaxis (of eligible)	94%	94%	95%	94%	93%	93%
By Gender						
Male	96%	96%	98%	95%	97%	92%
Female	92%	92%	97%	95%	89%	95%
By Place of Birth						
U.S. Born	95%	94%	98%	94%	97% (p=0.07)	93%
Foreign Born	93%	95%	97%	97%	90%	93%
By Race or Ethnicity						
Minority	94%	96%	97%	93%	93%	92%
White non-Hispanic	95%	91%	100%	100%	100%	97%
Hispanic	96%	95%	97%	91%	95%	97%
Black non-Hispanic	91%	97%	97%	96%	91%	89%
Asian/PI non-Hispanic	100%	100%	100%	100%	100%	75%
Other non-Hispanic	100%	100%	100%	100%	100%	100%

Prescription of PCP prophylaxis for eligible patients at all sites reviewed in this project was impressively high overall, ranging from 93% to 95%. Further, as illustrated in the table above, there appears to be no significant differences in rates of being on PCP prophylaxis among eligible patients by gender, place of birth, or race-ethnicity. All patients eligible for treatment were equally likely to be on PCP prophylaxis. In 2005 and 2006 respectively, 6% (7/127) and 7% (8/118) of eligible patients were not on PCP prophylaxis across all sites. Where there were documented reasons for not being on treatment, progress notes indicated that PCP prophylaxis was being considered pending further monitoring of CD4 counts.

****Given the high rates of PCP prophylaxis among eligible patients across all sites, clinic level comparisons are not displayed****

ANTIRETROVIRAL THERAPY

USPHS guidelines recommend **antiretroviral therapy** for all patients with a diagnosis of AIDS (CD4 count < 200 cells/mm³ or prior AIDS-defining condition), or who meet specific thresholds for CD4 cell count, or viral load. The USPHS criteria for CD4 count and viral load thresholds changed during the review period, and the guidelines in place during the year of review were used. The IHI target for this performance measure is for at least 90% of all patients eligible for ART to be prescribed ART.

Table 8. Percentage of Patients on ART (among eligible), Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size (ART eligible)	n=449	n=539	n=536	n=508	n=443	n=427
Aggregate Sites % On ART (of ART indicated)	89%	85%	88%	90%	91%	93%
By Gender						
Male	93%	87%	90%	91%	90%	92%
Female	90%	88%	90%	92%	94%	94%
By Place of Birth						
U.S. Born	89% (p=0.01)	86%	88% (p=0.04)	90% (p=0.05)	91%	92%
Foreign Born	97%	89%	94%	95%	94%	96%
By Race or Ethnicity						
Minority	91%	88%	93% (p=0.004)	93%	94% (p=0.02)	94%
White non-Hispanic	91%	85%	85%	89%	87%	90%
Hispanic	91%	90%	94% (p=0.004)	93%	93% (p=0.03)	94%
Black non-Hispanic	91%	86%	92%	92%	94%	95%
Asian/PI non-Hispanic	100%	100%	100%	100%	100%	100%
Other non-Hispanic	100%	100%	100%	67%	50%	50%

As a group, all BPHC sites reviewed performed well in meeting the IHI target of providing ART to at least 90% of the eligible patient population. Males and females were equally likely to be on ART when clinically indicated. In all years, foreign born patients tended to have higher rates of being on ART than U.S. born patients. In three of the review years, the differences were statistically significant. Racial or ethnic minorities were also more likely to be on ART than White non-Hispanic patients, with statistically significant differences observed in 2003 and 2005.

In both 2005 (36/443) and 2006 (29/427), about 8% of patients eligible for ART were not on ART. Progress notes indicated that ART was discussed with 95% of these patients. In 2005, of the patients not on ART where clinically indicated, 50% (18/36) refused ART. In 2006, 48% (14/29) refused treatment. Of the remaining patients eligible but not on ART, clinical notes

revealed that treatment was in progress. In most cases, treatment was pending further examination of CD4 or viral load laboratory results or stabilization of concurrent medical problems (including substance abuse, psychiatric illness, or medical care non-compliance).

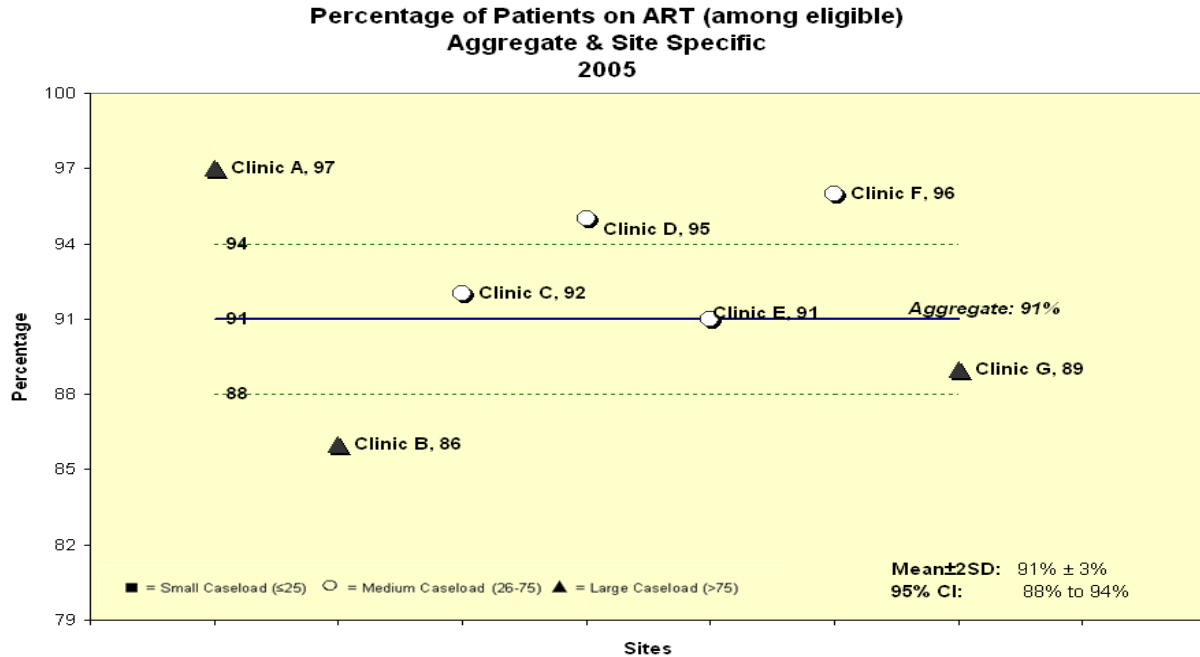
USPHS guidelines recommend use of ART for all pregnant women even if they do not meet ART treatment criteria to prevent HIV transmission from mother to child. Of the few patients pregnant during each review year across all BPHC, all were on ART. Some pregnancies were terminated and thus ART was not indicated.

Table 9. Percentage of Patients on ART (among eligible), Aggregate & Site-Specific

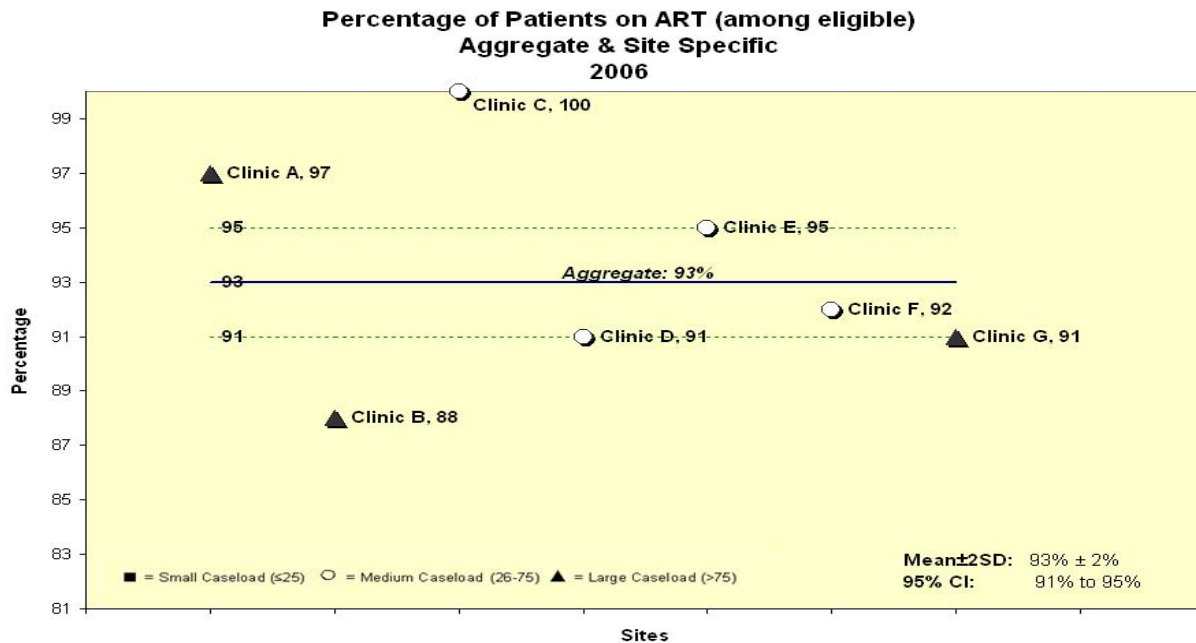
	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=449	n=539	n=536	n=508	n=443	n=427	
Aggregate Sites							
On ART (of ART indicated)	89%	85%	88%	90%	91%	93%	
By BPHC Site							
Clinic A	91%	84%	91%	94%	97%	97%	L
Clinic B	89%	80%	82%	89%	86%	88%	L
Clinic C	93%	86%	94%	94%	92%	100%	M
Clinic D	92%	97%	98%	97%	95%	91%	M
Clinic E	98%	90%	89%	91%	91%	95%	M
Clinic F	94%	92%	97%	88%	96%	92%	M
Clinic G	92%	92%	90%	90%	89%	91%	L
Clinic H	85%	61%	78%	79%	95%	89%	S
Clinic I	65%	75%	60%	85%	77%	90%	S

In the table above, we present the percentage of patients (eligible for ART) who were on ART each year by site. Due to variability in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*



In 2005, the aggregate mean percentage of patients who were on ART among those eligible was 91% (95% CI: 88% to 94%). Based on the 95% confidence interval, Clinic B tended to have a lower proportion of patients who were on ART when clinically indicated in 2005 and in 2006. In 2005, Clinic A, Clinic D, and Clinic F tended to have a higher proportion of patients who were on ART when clinically indicated.



In 2006, the aggregate mean percentage of eligible patients on ART was 93% (95% CI: 91% to 95%). Clinic A and Clinic C patients were more likely to be on ART when clinically indicated than all patients reviewed.

VIRAL HEPATITIS PREVENTION, SCREENING & TREATMENT

HEPATITIS B VACCINATION

Screening for hepatitis A, B and C viruses is important to ensure vaccination of patients at risk (for Hepatitis A and B) and for assessment of potential treatment for HCV. Rates of **hepatitis B and hepatitis C** screening across all sites during 2001-2006 were close to 100%. Hence, we present information on hepatitis A and B vaccination and hepatitis C treatment.

While there are no current national benchmarks or targets from HRSA for these measures, we found a study published in 2004 by the HIV Outpatient Study (HOPS) that reported on the rates of hepatitis A and hepatitis B vaccination among a sample of eligible HIV+ patients receiving care at 9 clinics located in 7 US cities.² In their sample:

- 32% of eligible patients had documented receipt of ≥ 1 dose of hepatitis B vaccine
- 23% of eligible patients had documented receipt of ≥ 1 dose of hepatitis A vaccine

Compared to this study's estimates, eligible patients at all BPHC sites reviewed were much more likely to have had received at least one dose of hepatitis B or hepatitis A vaccination.

Table 10. Percentage of Patients with any Hepatitis B Vaccine (among HBV-), Aggregate & Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size (HBV-)	n=235	n=280	n=305	n=279	n=253	n=232	
Aggregate Sites Any Hepatitis B Vaccine	85%	83%	86%	88%	89%	87%	
By BPHC Site							
Clinic A	66%	65%	66%	63%	62%	61%	L
Clinic B	83%	89%	89%	90%	91%	86%	L
Clinic C	90%	92%	94%	100%	100%	100%	M
Clinic D	88%	87%	83%	87%	89%	86%	M
Clinic E	81%	84%	88%	90%	88%	90%	M
Clinic F	88%	88%	91%	90%	90%	77%	M
Clinic G	79%	72%	74%	77%	79%	79%	L
<i>Clinic H</i>	100%	71%	86%	100%	100%	100%	S
<i>Clinic I</i>	83%	91%	100%	100%	100%	100%	S

² Tedaldi EM, Baker RK, Moorman AC, Wood KC, Fuhrer J, McCabe RE, Holmberg SD; HIV Outpatient Study (HOPS) Investigators. Hepatitis A and B vaccination practices for ambulatory patients infected with HIV. Clin Infect Dis. 2004 May 15;38(10):1478-84.

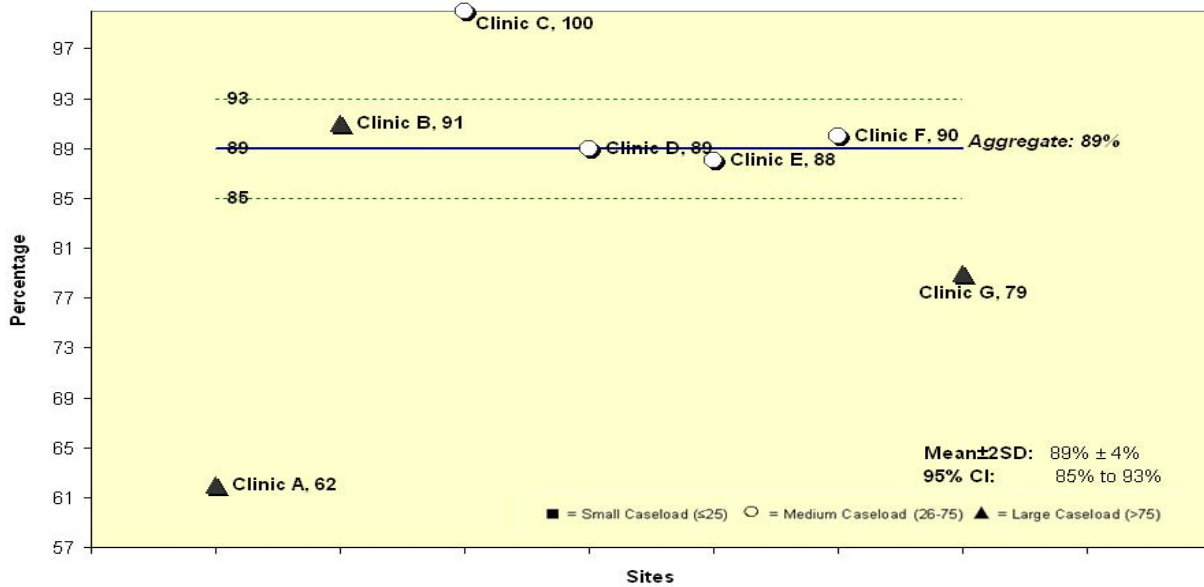
In the preceding table, we provide rates of receipt of at least one dose of **HBV vaccination** among patients who have had no evidence of prior HBV infection on screening across all sites reviewed. Between 83% and 89% of all eligible patients had ever received any HBV vaccine during the 6 year period. At the site level, a few clinics had relatively lower rates of providing HBV vaccinations. Due to the variability in sample sizes across clinics, some site to site comparisons should be interpreted with caution.

While we only collected and presented data on the receipt of at least one dose of HBV vaccination, please note that the proposed draft 2nd Tier HAB HIV Clinical Performance Measures require the complete hepatitis B vaccination series.³

****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

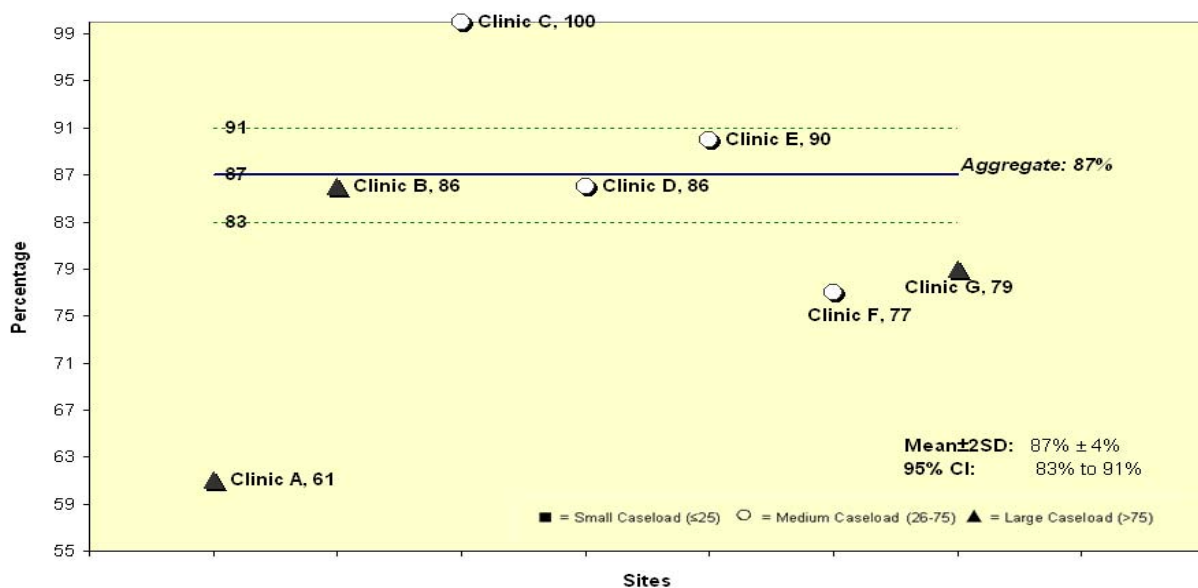
³ HRSA HAB HIV Draft Performance Measures... <ftp://ftp.hrsa.gov/hab/draftperfmeasure.pdf>

**Percentage of Patients with any Hepatitis B Vaccine (among HBV -)
Aggregate & Site Specific
2005**



The aggregate mean percentage of patients with documented receipt of any dose of hepatitis B vaccine among those HBV negative was 89% (95% CI: 85% to 93%) in 2005 and 87% (95% CI: 83% to 91%) in 2006. In both years, Clinic C patients were more likely to have any Hepatitis B vaccine compared to all sites. However, Clinic A and Clinic G tended to have a lower percentage of patients (HBV-) with documented receipt of any dose of hepatitis B vaccine. In 2006, Clinic F also tended to have a lower proportion of patients with documented receipt of any dose of hepatitis B vaccine.

**Percentage of Patients with any Hepatitis B Vaccine (among HBV -)
Aggregate & Site Specific
2006**



HEPATITIS A SCREENING AND VACCINATION

Hepatitis A screening rates are lower across all sites relative to hepatitis B and C screening. Between 77% and 83% of all patients reviewed in 2001-2006 had ever been screened for HAV. As described above, in 2004, the HIV Outpatient Study (HOPS) published a report on the rates of hepatitis A and hepatitis B vaccination among eligible patients in a sample of HIV patients receiving care at 9 clinics located in 7 US cities. In this study, about 23% of eligible patients had documented receipt of ≥ 1 dose of hepatitis A vaccine.

Table 11. Percentage of Patients with any Hepatitis A Vaccine (among HAV-), Aggregate & Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size (HAV-)	n=210	n=253	n=266	n=250	n=221	n=210	
Aggregate Sites Any Hepatitis A Vaccine	73%	66%	69%	73%	76%	79%	
By BPHC Site							
Clinic A	59%	53%	44%	45%	53%	49%	L
Clinic B	83%	87%	92%	93%	94%	95%	L
Clinic C	38%	14%	50%	63%	67%	67%	M
Clinic D	64%	61%	58%	66%	64%	70%	M
Clinic E	75%	83%	96%	95%	84%	88%	M
Clinic F	75%	68%	75%	71%	79%	67%	M
Clinic G	78%	71%	77%	79%	79%	79%	L
<i>Clinic H</i>	83%	78%	71%	89%	88%	100%	S
<i>Clinic I</i>	100%	67%	50%	50%	75%	100%	S

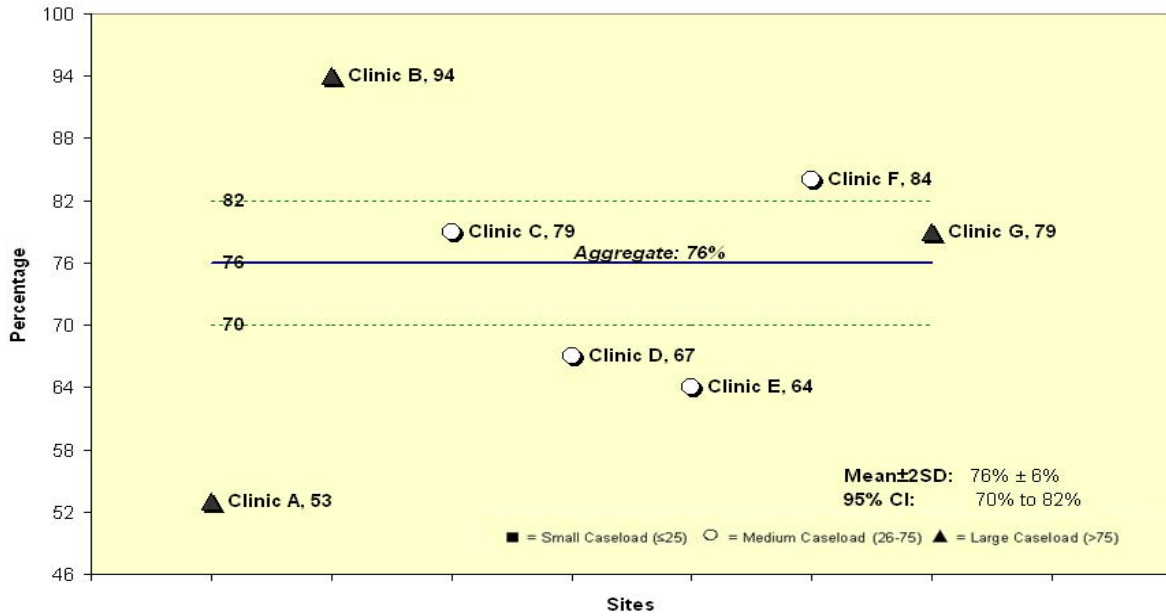
Patients who are hepatitis A negative should receive the **hepatitis A vaccination** regimen to prevent viral infection. Of patients who were screened and have no evidence of hepatitis A infection, nearly 80% had received at least one dose of the hepatitis A vaccine in 2006.

In the table above, we also present the percentage of patients (HAV-) who had received any dose of hepatitis A vaccine each year by site. Rates of receiving any dose of hepatitis A vaccination were variable across sites. Due to differences in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

While we only collected and presented data on the receipt of at least one dose of HAV vaccination, please note that the proposed draft 3rd Tier HAB HIV Clinical Performance Measures require the complete 2 dose hepatitis A vaccination regimen.

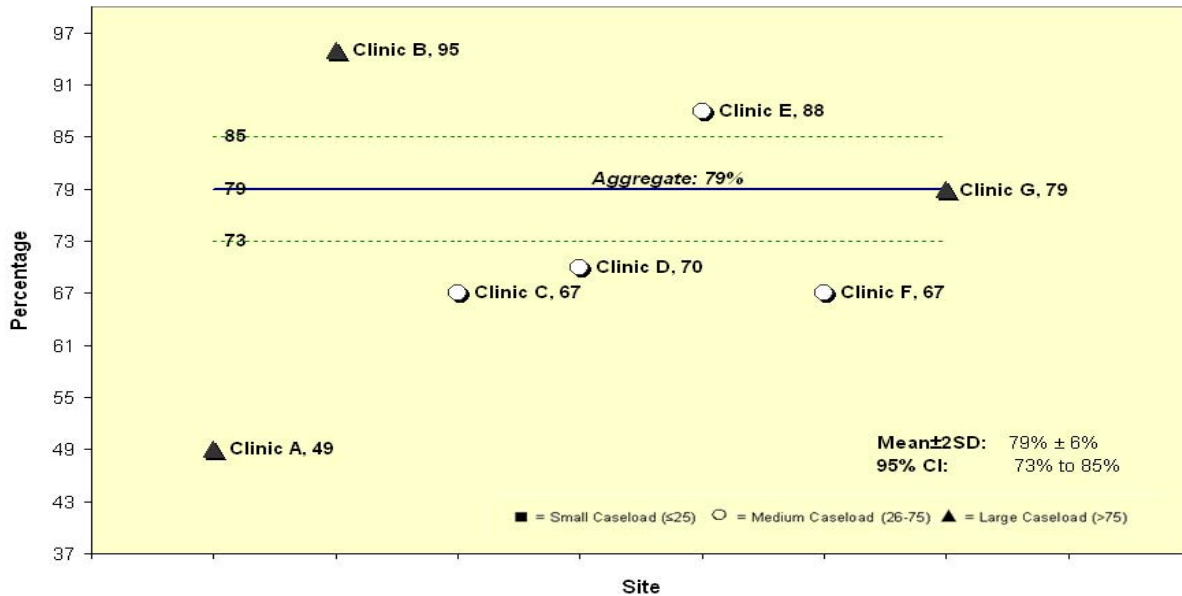
****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

**Percentage of Patients with any Hepatitis A Vaccine (among HAV-)
Aggregate & Site Specific
2005**



The aggregate mean percentage of HAV negative patients with any dose of Hepatitis A vaccination was 76% (95% CI: 70% to 82%) in 2005 and was 79% (95% CI: 73% to 85%) in 2006. Among eligible patients (HAV-), those at Clinic B tended to have documented receipt of any dose of hepatitis vaccine in both years compared to all patients reviewed. Clinic A and Clinic D had a lower proportion of patients (HAV-) with documented receipt of any hepatitis A vaccine in both 2005 and 2006.

**Percentage of Patients with any Hepatitis A Vaccine (among HAV-)
Aggregate & Site Specific
2006**



HEPATITIS C TREATMENT

Among patients who are HCV antibody positive, we determined whether **HCV treatment** had ever been provided. We excluded patients with undetectable HCV viral load (viral load measured), since this would be a contraindication for treatment. Of potential candidates, we examined rates of ever receiving HCV treatment across all sites. Non-adherence to care and other select medical co-morbidities (significant liver disease, active substance abuse, psychiatric problems) could also be reasons for no treatment.

Table 12. Percentage of Patients who ever had HCV treatment (among HCV+), Aggregate

	2001	2002	2003	2004	2005	2006	Size
HCV Positive	39%	35%	33%	29%	27%	25%	
Potential candidates for HCV treatment	n=195	n=209	n=181	n=156	n=119	n=106	
Aggregate Sites HCV treatment (Ever, of candidates)	4%	12%	21%	26%	28%	26%	
By BPHC Site							
Clinic A	8%	9%	11%	6%	28%	32%	L
Clinic B	0%	20%	33%	60%	80%	67%	L
Clinic C	0%	0%	6%	17%	22%	44%	M
Clinic D	0%	5%	10%	23%	22%	24%	M
Clinic E	9%	11%	4%	13%	15%	11%	M
Clinic F	13%	25%	38%	14%	17%	0%	M
Clinic G	12%	14%	22%	29%	30%	30%	L
<i>Clinic H</i>	0%	0%	6%	9%	33%	25%	S
<i>Clinic I</i>	0%	25%	33%	67%	0%	0%	S

The proportion of patients with hepatitis C declined throughout the 6 year period from 39% in 2001 to 25% in 2006. Among patients who were HCV antibody positive each year, the rate of ever having received HCV treatment increased from 4% in 2001 to 26% in 2006 overall. This increase may likely reflect the availability of better treatment options (including combination therapy of oral ribavirin and pegylated interferon) during this time period.

****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

PNEUMOCOCCAL VACCINATION

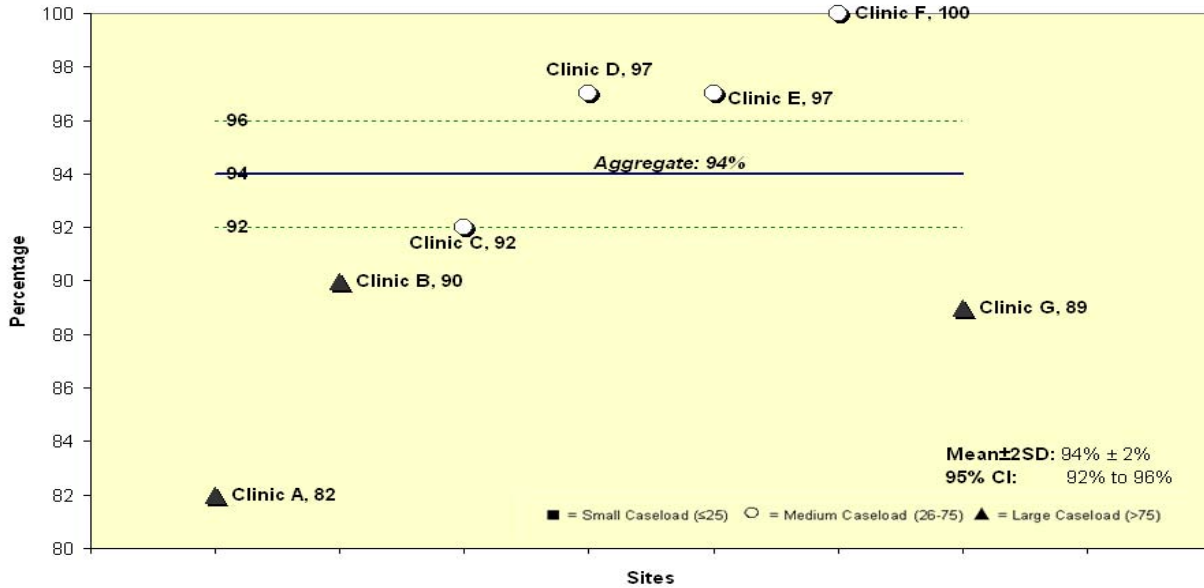
Patients with HIV infection are at greater risk for pneumococcal infection. It is recommended that all HIV patients be given **pneumococcal vaccine** soon after HIV diagnosis. For each patient reviewed, we determined whether pneumococcal vaccine was ever administered. While some guidelines now recommend revaccination, there remained enough ongoing controversy that the measure of ever vaccinated regardless of time since administration was used.

Table 13. Percentage of Patients with Documented Pneumococcal Vaccination, Aggregate & Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=509	n=624	n=657	n=604	n=525	n=496	
Aggregate Sites							
Pneumovax	94%	92%	90%	93%	94%	92%	
By BPHC Site							
Clinic A	90%	90%	81%	83%	82%	84%	L
Clinic B	83%	83%	87%	90%	90%	87%	L
Clinic C	100%	97%	92%	97%	92%	90%	M
Clinic D	99%	99%	94%	93%	97%	98%	M
Clinic E	97%	88%	93%	96%	97%	96%	M
Clinic F	90%	88%	88%	97%	100%	87%	M
Clinic G	89%	81%	89%	92%	89%	87%	L
<i>Clinic H</i>	93%	95%	85%	93%	95%	100%	S
<i>Clinic I</i>	100%	100%	100%	100%	100%	100%	S

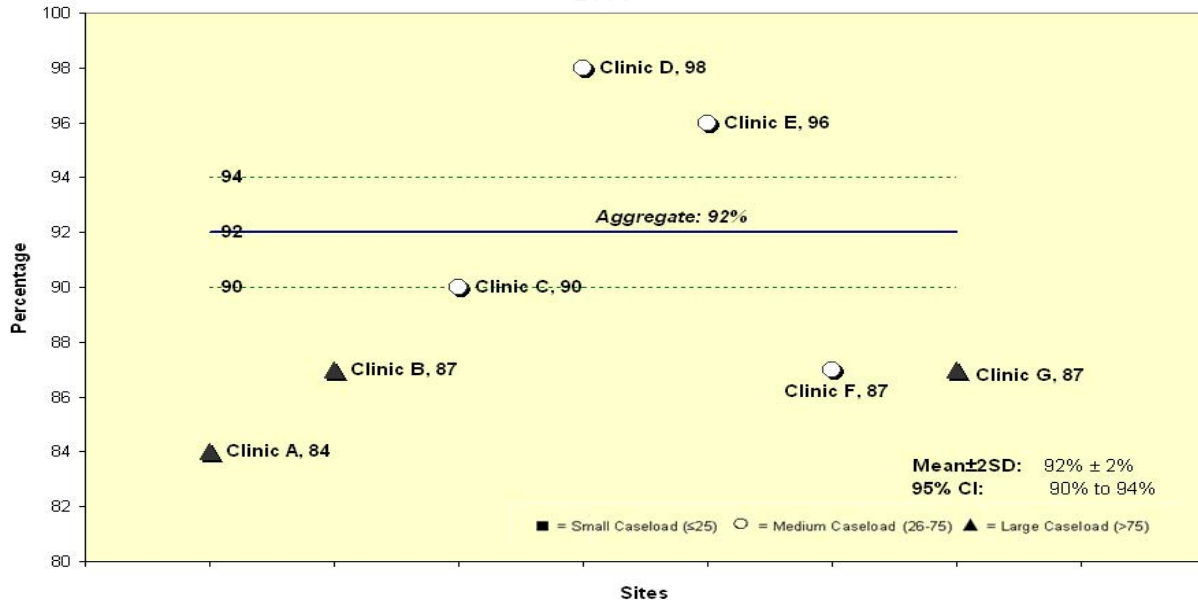
At least 90% of all patients have ever received a pneumococcal vaccination in any given year throughout the review period. Rates were equally high across all sites.

**Percentage of Patients with Documented Pneumococcal Vaccination
Aggregate & Site Specific
2005**



The aggregate mean percentage of patients who had ever received a pneumococcal vaccine was 94% (95% CI: 92% to 96%) in 2005 and 95% (95% CI: 90% to 94%) in 2006. In both years, Clinic E and Clinic D patients were more likely to have ever received a pneumococcal vaccine compared to all sites. However, Clinic A, Clinic B, and Clinic G patients were less likely to have documented receipt of a pneumococcal vaccine compared to patients at all sites.

**Percentage of Patients with Documented Pneumococcal Vaccination
Aggregate & Site Specific
2006**



CERVICAL CANCER SCREENING (PAP SMEARS)

Women with HIV infection are at higher risk for cervical cancer, and regular screening through Pap smears is recommended. While risk of anal cancer related to HPV infection is also increased, no specific guidelines exist for screening, and low rates of anal Pap smears were seen across clinics. Therefore, we only present data on cervical cancer screening. Although criteria have changed during the 6 year period, we used receipt of a documented Pap smear in the year as the indicator, even though more frequent screenings have been recommended in some years. Information on performance of Pap smears, results of the screening, and referrals for follow-up of abnormal Pap smears were collected for each patient reviewed.

Under the 2nd Tier HAB HIV Clinical Performance Measures, it is recommended that Pap smears are done every 12 months. While there is no current national benchmark or target from HRSA for this measure, we found a study published in 2001 by the HIV Cost and Service Utilization Study (HCSUS) that reported on the rates of Pap smears, abnormal Pap smears, and referral rates among a national sample representing over 43,000 women receiving HIV treatment.⁴ Data were gathered during the first follow-up interview of the HCSUS cohort from December 1996 to July 1997. Of this representative sample of female patients with HIV:

- 81% had a Pap smear in the past 12 months
- 27% of Pap smears were abnormal
- 95% of patients with abnormal Pap smears were scheduled for a repeat Pap or colposcopy (however, only 85% followed through with the referral)

These statistics may serve as a comparison for BPHC sites.

Table 14. Percentage of Patients Receiving Pap Smears, Rates of Abnormal Pap, and Referrals

	2001	2002	2003	2004	2005	2006
Total Females	n=212	n=250	n=269	n=262	n=218	n=217
Pap Smears	68%	67%	67%	71%	78%	68%
% Abnormal Pap	26%	32%	28%	27%	17%	21%
% Referred of Abnormal Paps	79%	75%	85%	76%	100%	98%

Note: Percentage of Pap smears is inclusive of females who may have had colposcopies.

Between 67% and 78% of all female patients in our sample had received a Pap smear during each review year over the 6-year period. About 30% of Pap smears were abnormal from 2001 to 2004 and about 20% were abnormal in 2005 and 2006. Referral rates for abnormal Pap smears were generally high ranging from 75% to 100% across all sites throughout the 6 years.

⁴Stein MD, Cunningham WE, Nakazono T, Turner BJ, Andersen RM, Bozzette SA, Shapiro MF; HCSUS Consortium. Screening for cervical cancer in HIV-infected women receiving care in the United States. *J Acquir Immune Defic Syndr*. 2001 Aug 15;27(5):463-6.

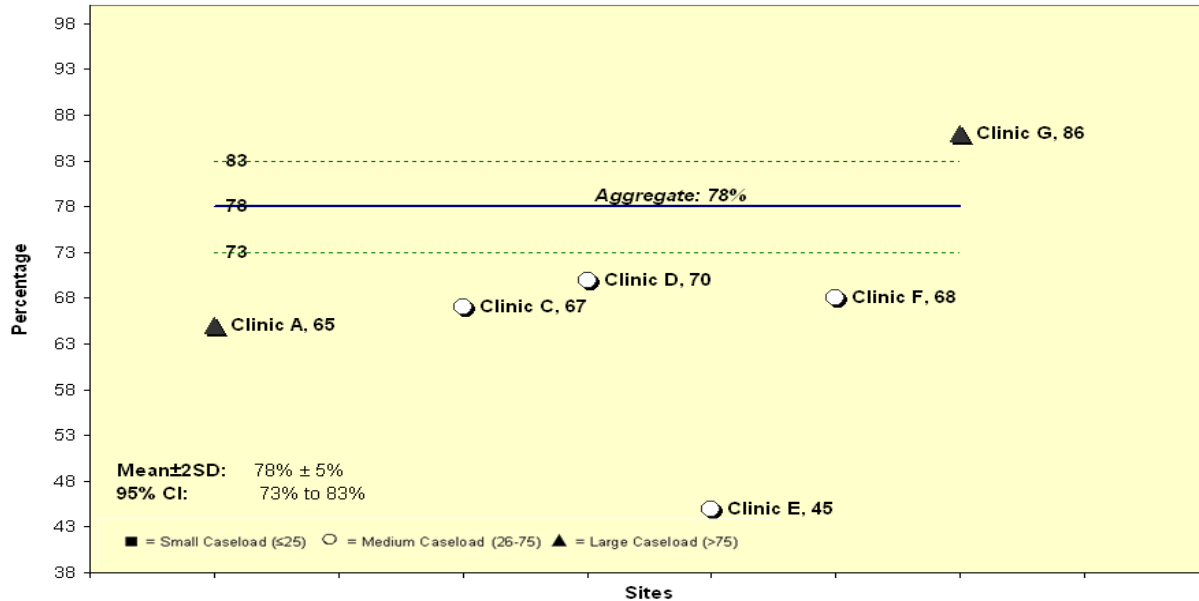
Table 15. Percentage of Female Patients Receiving Pap Smears, Aggregate & Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=212	n=250	n=269	n=262	n=218	n=217	
Aggregate Sites							
Pap Smears	68%	67%	67%	71%	78%	68%	
By BPHC Site							
Clinic A	58%	56%	60%	63%	65%	65%	L
Clinic B	-	-	-	-	-	-	L
Clinic C	80%	79%	59%	75%	67%	70%	M
Clinic D	72%	78%	59%	62%	70%	72%	M
Clinic E	44%	42%	44%	55%	45%	67%	M
Clinic F	74%	60%	83%	78%	68%	67%	M
Clinic G	59%	67%	78%	70%	86%	79%	L
<i>Clinic H</i>	63%	82%	67%	67%	100%	56%	S
<i>Clinic I</i>	75%	73%	100%	64%	100%	71%	S

In the table above, we present the percentage of female patients who have received a Pap smear each year by site. Clinic B was excluded from this analysis given the small number of female patients sampled at the site. Due to the variability in sample sizes across clinics, some site to site comparisons should be interpreted with caution.

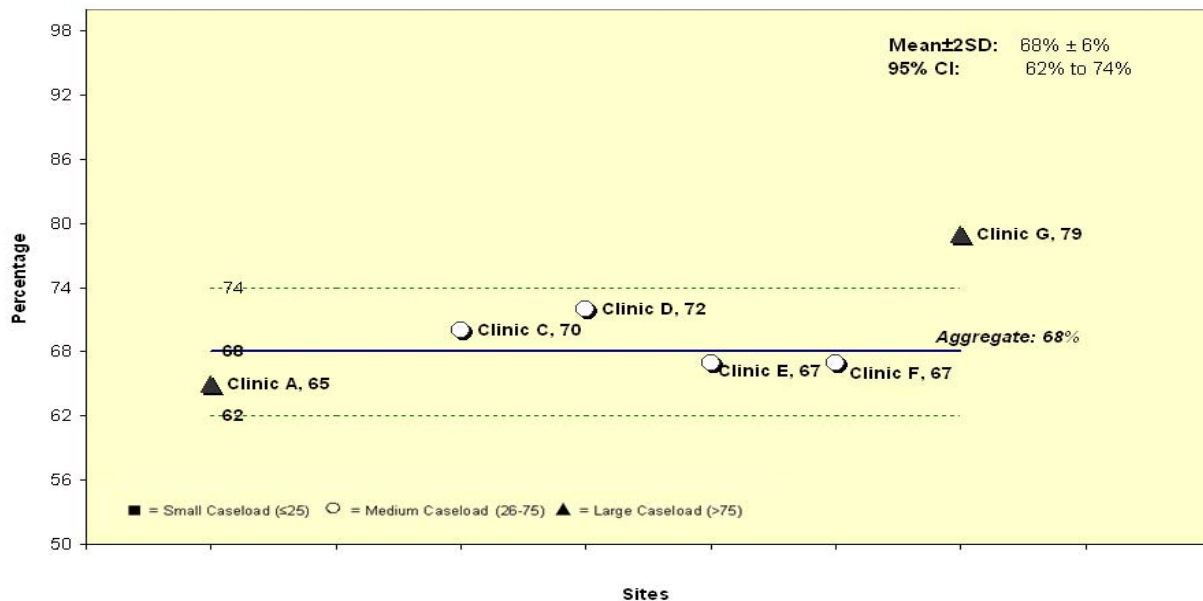
****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

**Percentage of Female Patients Receiving Pap Smears
Aggregate & Site Specific
2005**



In 2005, the aggregate mean percentage of female patients who had received a Pap smear was 78% (95% CI: 73% to 83%). Based on a 95% confidence interval, almost all sites tended to have a lower proportion of female patients receiving Pap smears, except for Clinic G.

**Percentage of Female Patients Receiving Pap Smears
Aggregate & Site Specific
2006**



In 2006, the aggregate mean percentage of female patients who had ever received a Pap smear was 68% (95% CI: 62% to 74%). In 2006, female patients at Clinic G were more likely to have received a Pap smear than patients at all sites.

PART II. CLINICAL OUTCOME INDICATORS

In addition to using process indicators to evaluate adherence to HIV/AIDS clinical care standards and treatment guidelines, JSI also collected data on clinical outcomes to assess the health status of patients sampled at BPHC sites. Thus, for each review year, information for the following outcome indicators was collected:

- Viral suppression throughout Year (among patients on ART at all anytime during year)
- Last viral load ≤ 400 (among patients on ART at last visit)
- Last CD4 count > 200
- All-cause hospitalizations

This section presents aggregate and site-specific data on these outcome measures. Further, for select indicators, clinical outcomes by demographic subgroups (gender, place of birth, race-ethnicity) are also provided.

VIRAL LOAD SUPPRESSION THROUGHOUT YEAR (Among patients on ART at anytime during year)

Viral load is an important measure of ART effectiveness, and suppression below the level of detection is the goal of treatment. All viral loads obtained during the year were collected for every patient reviewed. We used the cutoff of ≤ 400 copies/ml due to variability in the use of ultrasensitive viral load tests across sites during a number of review periods. A patient has achieved viral suppression if all viral loads obtained during the year were undetectable. Only patients with documentation of being on ART during the review year were included.

Table 16. Percentage of Patients on ART who Always and Never Had Viral Suppression, Aggregate

	2001	2002	2003	2004	2005	2006
Always viral suppressed (VL always ≤ 400 , On ART)						
BPHC Sites	49%	39%	43%	58%	61%	73%
HIVRN*	34%	35%	37%	42%	47%	51%
Never viral suppressed (VL never ≤ 400 , On ART)						
BPHC Sites	25%	29%	22%	16%	13%	9%
HIVRN*	33%	33%	28%	27%	24%	21%

Overall improvements in viral suppression were observed from 2001 to 2006, with an increase in the proportion of patients who always maintained an undetectable viral load throughout the year each year, and a decrease in the percentage of patients with consistently detectable viral loads. Specifically, in 2006, 73% of patients maintained viral suppression throughout the year, compared to only 49% in 2001.

On the other hand, about a quarter of patients at all sites had viral loads that were always greater than 400 between 2001 and 2003. From 2003 onwards, however, there has been a steady decline in the proportion of patients with consistently detectable viral loads throughout a given year. In 2006, 9% of all patients never achieved viral suppression.

*Throughout the 6 review years, patients at BPHC sites were more likely to have achieved viral suppression and less likely to have detectable viral loads compared to patients in the HIV Research Network, a consortium of 19 sites across the US that provide medical care to adult HIV patients.

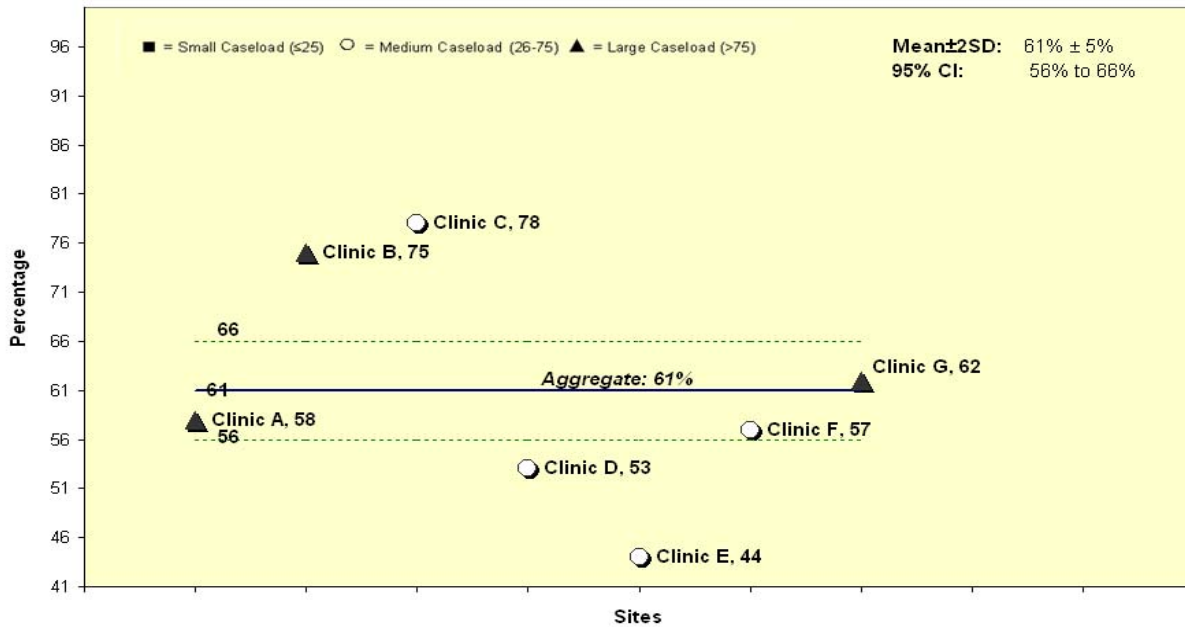
Table 17. Percentage of Patients on ART who always had Viral Suppression (VL≤400) throughout year, Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=410	n=470	n=483	n=466	n=407	n=398	
Aggregate Sites							
% of Patients with Always VL ≤ 400	49%	39%	43%	58%	61%	73%	
By BPHC Site							
Clinic A	50%	46%	34%	61%	58%	71%	L
Clinic B	58%	48%	45%	69%	75%	76%	L
Clinic C	40%	17%	32%	74%	78%	71%	M
Clinic D	47%	34%	32%	39%	53%	68%	M
Clinic E	58%	45%	34%	48%	44%	69%	M
Clinic F	55%	36%	50%	52%	57%	65%	M
Clinic G	44%	46%	57%	61%	62%	67%	L
Clinic H	55%	9%	33%	47%	61%	71%	S
Clinic I	36%	58%	50%	55%	60%	100%	S

In the table above, we present the percentages of patients (on ART at any time during year) who always had viral suppression or undetectable viral loads throughout the year each year by site. Due to the variability in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

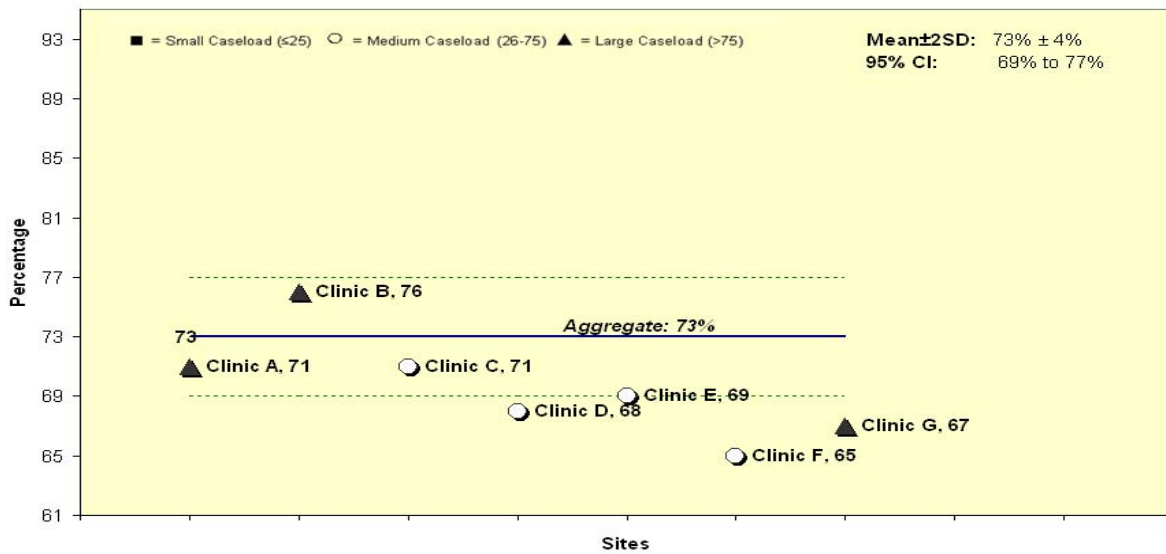
****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

**Patients who always had Viral Suppression (VL≤400) throughout year
Aggregate & Site-Specific
2005**



Among patients on ART, 61% (95% CI: 56% to 66%) in 2005 and 73% (95% CI: 69% to 77%) in 2006 had viral load suppression throughout the year. Based on a 95% confidence interval, in 2005, Clinic B and Clinic C tended to have more patients with viral load suppression compared to all sites, while Clinic D and Clinic E tended to have a lower proportion of patients with viral load suppression. In 2006, Clinic D, Clinic E, and Clinic G had lower proportions of patients with undetectable viral loads compared to all sites.

**Patients who always had Viral Suppression (VL≤400) throughout year
Aggregate & Site-Specific
2006**



LAST VIRAL LOAD IN YEAR
(Among patients on ART at Last Visit)

To determine the effectiveness of ART, we also examined the last viral load measured each year for patients who were on ART at last visit at all sites. Suppression or an undetectable viral load is defined as ≤ 400 copies/ml. The cutoff of ≤ 400 copies/ml was used due to variability in the use of ultrasensitive viral load tests across sites.

Table 18. Percentage of Patients with last VL ≤ 400 (on ART at last visit), Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size	n=392	n=441	n=436	n=430	n=394	n=388
Aggregate Sites						
% of Patients with Last VL ≤ 400	64%	56%	72%	75%	80%	87%
By Gender						
Male	65%	58%	73%	77%	77%	86%
Female	67%	66%	73%	78%	83%	87%
By Place of Birth						
U.S. Born	63%	58%	72%	74%	79%	85%
	(p=0.07)	(p=0.04)		(p=0.03)		
Foreign Born	73%	67%	74%	83%	81%	88%
By Race or Ethnicity						
Minority	64%	57%	68%	75%	78%	86%
		(p=0.05)	(p=0.003)	(p=0.04)		
White non-Hispanic	70%	68%	82%	84%	84%	87%
Hispanic	55%	49%	64%	69%	77%	86%
	(p=0.01)	(p=0.002)	(p=0.003)	(p=0.05)		
Black non-Hispanic	73%	67%	71%	80%	78%	86%
Asian/PI non-Hispanic	83%	75%	92%	82%	83%	91%
Other non-Hispanic	100%	33%	33%	100%	100%	100%
By Year of Diagnosis*						
Diagnosed in Year	-	52%	50%	-	64%	76%
			(p=0.0001)		(p=0.02)	(p=0.06)
Diagnosed Previously	-	62%	76%	-	82%	87%

*Due to the small number of newly diagnosed patients reviewed in 2001 and 2004, no relevant data are presented for those years. Patients newly diagnosed in a given year are compared to patients diagnosed in all years prior to that year.

From 2001 to 2006, a substantial increase is noted in the proportion of patients who achieved viral suppression at the end of each year. Among patients who were on ART at last visit, 87% had undetectable last viral loads in 2006, compared to 64% in 2001.

In examining rates by demographic subgroups, there were no patterns to indicate any differences in last viral load by gender.

- However, in all years, foreign born patients tended to have undetectable last viral loads than U.S. born patients, with significant differences observed in 3 of the 6 review years.

- White non-Hispanic patients were also significantly more likely to have achieved viral suppression than minority patients throughout the 6 year period, although these differences were not significant in 2005 and 2006.
- Among minorities, Hispanics were less likely to have undetectable viral loads than other racial or ethnic minorities, except in 2005 and 2006.
- Furthermore, patients newly diagnosed with HIV in any given year were less likely to have achieved viral suppression than patients diagnosed in previous years.

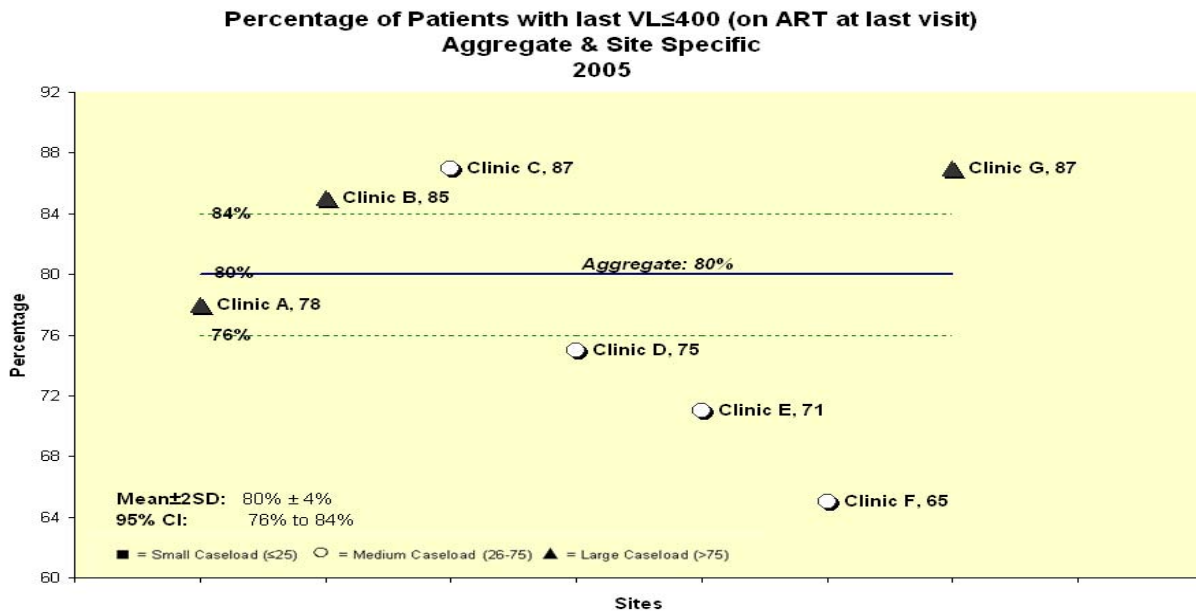
Table 19. Percentage of Patients with last VL ≤400 (on ART at last visit), Aggregate & Site-Specific

	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=392	n=441	n=436	n=430	n=394	n=388	
Aggregate Sites							
% of Patients with VL ≤ 400	64%	56%	72%	75%	80%	87%	
*HIVRN	53%	53%	56%	62%	64%	67%	
By BPHC Site							
Clinic A	70%	65%	67%	75%	78%	85%	L
Clinic B	69%	69%	84%	88%	85%	90%	L
Clinic C	54%	42%	74%	86%	87%	86%	M
Clinic D	57%	46%	49%	56%	75%	88%	M
Clinic E	73%	58%	69%	82%	71%	94%	M
Clinic F	62%	52%	59%	57%	65%	68%	M
Clinic G	68%	78%	80%	82%	87%	87%	L
<i>Clinic H</i>	64%	10%	71%	68%	94%	82%	S
<i>Clinic I</i>	56%	80%	83%	64%	78%	100%	S

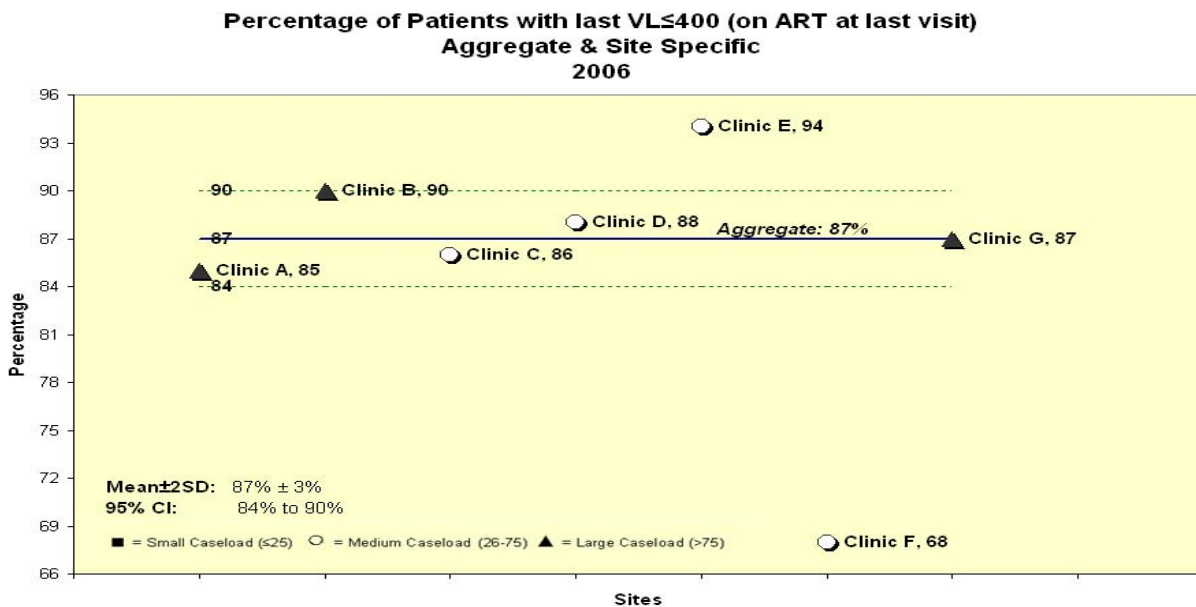
In the table above, we present the percentages of patients (on ART at last visit) with undetectable last viral loads each year by site. Due to variability in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

*Throughout the 6 review years, a greater proportion of patients at BPHC sites had last viral loads that are below the detectable level compared to patients in the HIV Research Network.

****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*



In 2005, the aggregate mean percentage of patients who were on ART and had undetectable last viral load at last visit was 80% (95% CI: 76% to 84%). Based on a 95% confidence interval, in 2005, Clinic B, Clinic G, and Clinic C tended to have more patients with an undetectable last viral load compared to all sites while Clinic D and Clinic E tended to have fewer patients with undetectable last viral load.



In 2006, the aggregate mean percentage of patients who were on ART and had undetectable last viral loads was 87% (95% CI: 84% to 90%). Based on a 95% confidence interval, in 2006, almost all sites were close to the mean percentage. Clinic E tended to have more patients with undetectable last viral loads, while Clinic F tended to have fewer patients with viral suppression compared to all sites.

LAST CD4 COUNT > 200 IN YEAR

CD4 counts are a direct measure of immune function and HIV-related progression. Achieving a CD4 count > 200 significantly reduces the risk of AIDS-related conditions such as PCP and other opportunistic infections, and further disease progression. Therefore, the last CD4 count collected for each patient each year was selected for use as an outcome indicator.

Table 20. Percentage of Patients with last CD4>200, Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size	n=509	n=624	n=657	n=604	n=525	n=496
Aggregate Sites						
% of Patients with Last CD4 >200	80%	80%	86%	84%	81%	86%
By Gender						
Male	81%	83%	85%	85%	81% (p=0.04)	84% (p=0.0001)
Female	85%	83%	88%	88%	89%	91%
By Place of Birth						
U.S. Born	82%	83%	86%	84% (p=0.09)	84%	84%
Foreign Born	85%	82%	86%	89%	86%	90%
By Race or Ethnicity						
Minority	81% (p=0.04)	80% (p=0.004)	84% (p=0.03)	83% (p=0.004)	80% (p=0.0007)	85%
White non-Hispanic	88%	89%	90%	92%	94%	91%
Hispanic	79% (p=0.04)	79% (p=0.003)	82%	79% (p=0.009)	78% (p=0.01)	83%
Black non-Hispanic	83%	83%	86%	87%	81%	87%
Asian/PI non-Hispanic	75%	65%	79%	86%	80%	77%
Other non-Hispanic	-	50%	71%	83%	86%	100%
By Year of Diagnosis						
Diagnosed in Year	-	79%	83%	-	68% (p=0.002)	81% (p=0.09)
Diagnosed Previously	-	83%	86%	-	86%	88%

*Due to the small number of newly diagnosed patients reviewed in 2001 and 2004, no relevant data are presented for those years. Patients newly diagnosed in a given year are compared to patients diagnosed in all years prior to that year.

Overall, the proportion of patients who achieve a last CD4 of greater than 200 at the end of each year remained somewhat consistent around 80% to 86% throughout the 6 year period, with a slight increasing trend noted.

In 2005 and 2006, females were significantly more likely to have last CD4>200 than males. Although a greater or similar proportion of foreign born patients tended to have last CD4>200 than U.S. born patients, this difference was statistically significant in only 2004. In all years except 2006, racial or ethnic minorities were significantly less likely to achieve a last CD4>200 compared to White non-Hispanics. Among minorities, Black non-Hispanics were more likely to have CD4>200 than Hispanics. Also, patients newly diagnosed in year were less likely to have a last CD4 >200 compared to patients diagnosed in previous years.

Table 21. Percentage of Patients with last CD4>200, Aggregate & Site-Specific

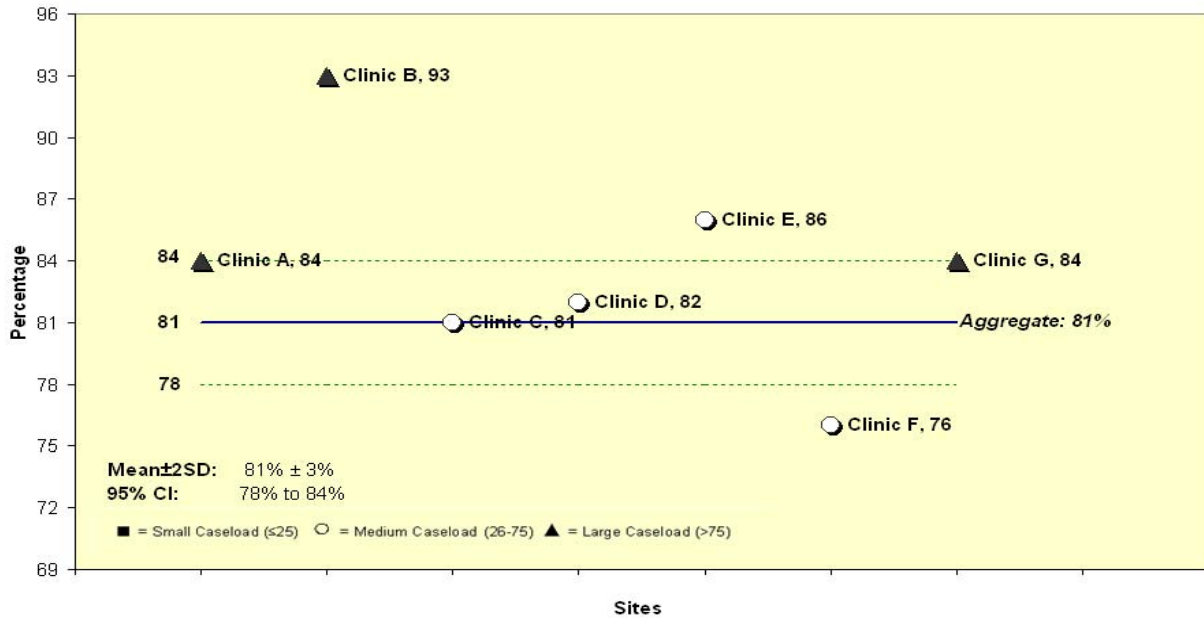
	2001	2002	2003	2004	2005	2006	Size
Total Sample Size	n=509	n=624	n=657	n=604	n=525	n=496	
Aggregate Sites							
% of Patients with Last CD4 >200	80%	80%	86%	84%	81%	86%	
*HIVRN	67%	71%	72%	73%	74%	78%	
By BPHC Site							
Clinic A	86%	83%	81%	87%	84%	85%	L
Clinic B	87%	92%	92%	95%	93%	92%	L
Clinic C	84%	81%	85%	83%	81%	86%	M
Clinic D	75%	73%	73%	69%	82%	81%	M
Clinic E	88%	78%	88%	89%	86%	91%	M
Clinic F	80%	73%	88%	76%	76%	87%	M
Clinic G	82%	83%	87%	89%	84%	90%	L
<i>Clinic H</i>	53%	68%	79%	71%	76%	70%	S
<i>Clinic I</i>	84%	78%	91%	86%	71%	92%	S

In the table above, we present the percentage of patients with last CD4 >200 each year by site. Due to variability in sample sizes across the clinics, some site to site comparisons should be interpreted with caution.

*Throughout the 6 review years, the proportion of patients with last CD4 of greater than 200 was higher at BPHC sites than patients in the HIV Research Network.

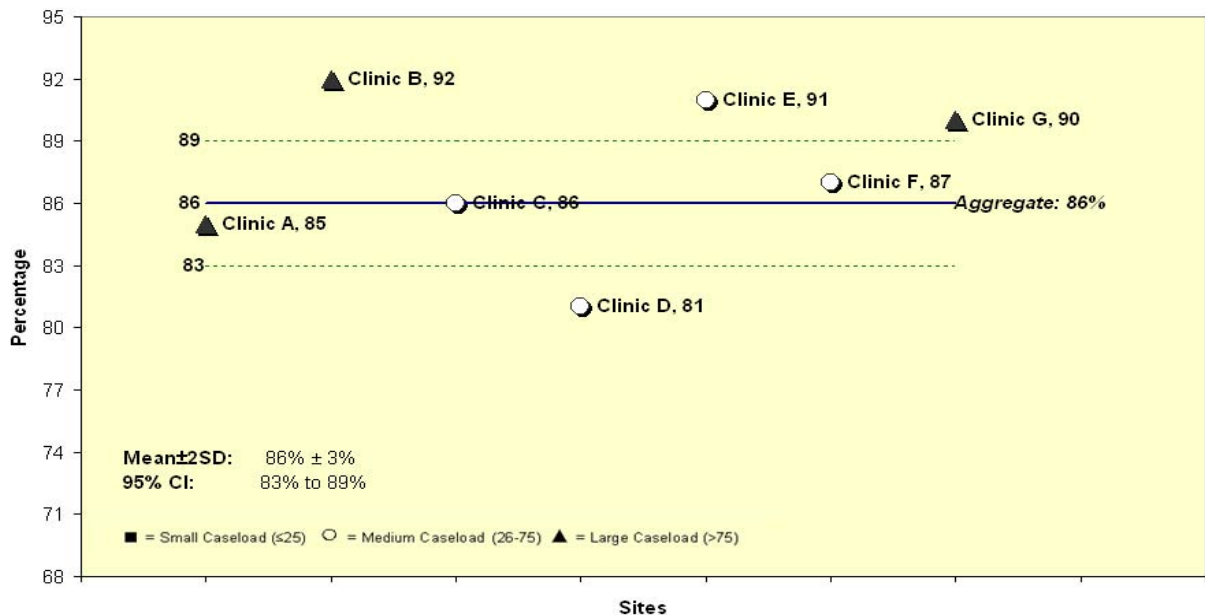
****Clinic H & Clinic I have small caseloads of 25 or fewer patients, and thus variations in performance across years within the clinics and performance relative to other sites may not necessarily be accurate comparisons.*

**Percentage of Patients with last CD4>200
Aggregate & Site Specific
2005**



The aggregate mean percentage of patients who achieved a last CD4 of greater than 200 at the end of 2005 was 81% (95% CI: 78% to 84%) and 86% (95% CI: 83% to 89%) at the end of 2006. Based on a 95% confidence interval, Clinic B and Clinic E patients were more likely to have achieved a last CD4>200 at the end of both years than patients at all sites.

**Percentage of Patients with last CD4>200
Aggregate & Site Specific
2006**



ALL-CAUSE HOSPITALIZATIONS

Hospitalizations for all causes were documented during the chart review process. Presented below are the percentages of patients with documentation of ever having been hospitalized each year across all sites. Since we also included hospitalizations for non-HIV related conditions, data should not be used to infer trends in HIV-related morbidity. However, studies have found that HIV-related hospitalizations are decreasing while hospitalizations due to other causes have remained stable. Differences in documentation and missing or incomplete data on hospitalizations in patient records may also have reduced measures of hospitalization rates in some sites.

Table 22. Percentage of Patients with documented Hospitalizations, Aggregate & by Subgroups

	2001	2002	2003	2004	2005	2006
Total Sample Size	n=509	n=624	n=657	n=604	n=525	n=496
Aggregate Sites						
% Ever Hospitalized in Year	15%	18%	17%	16%	14%	14%
By Gender						
Male	15%	19%	16% (p=0.06)	14% (p=0.02)	13%	14%
Female	16%	18%	23%	21%	17%	17%
By Place of Birth						
U.S. Born	17% (p=0.03)	22% (p=0.0001)	24% (p<0.0001)	21% (p=0.0003)	19% (p=0.001)	19% (p=0.003)
Foreign Born	9%	9%	8%	10%	8%	9%
By Race or Ethnicity						
Minority	16%	21% (p=0.03)	20%	18%	16%	15%
White non-Hispanic	14%	14%	15%	15%	11%	15%
Hispanic	13%	22%	20%	19%	15%	13%
Black non-Hispanic	20%	21%	21%	17%	18%	16%
Asian/PI non-Hispanic	8%	7%	14%	7%	7%	15%
Other non-Hispanic	50%	29%	25%	29%	0%	0%
By HIV Stage						
HIV	11% (p=0.007)	13% (p=0.0008)	14% (p=0.005)	11% (p=0.0007)	13%	12%
AIDS	19%	24%	23%	22%	16%	17%

Overall hospitalization rates remained the same across all-sites. Fourteen to 18% of patients sampled from all sites have ever been hospitalized each year between 2001 and 2006.

In all years, US born patients were significantly more likely to have at least one documented hospitalization than foreign born patients. About 10% of foreign born patients had any documented hospitalization each year, compared to 20% of US born patients. No consistent

differences were observed by gender or race or ethnicity. However, patients with an AIDS-defining condition were more significantly more likely to ever have been hospitalized.

In 2005, a study was published using data from the HIV Research Network, a consortium of 19 sites across the US that provide medical care to adult HIV patients.⁵ Specifically, it examined data on health care utilization, including hospitalization admissions and outpatient visits. Among over 13,000 patients in 2000, 15,000 in 2001, and 14,000 in 2002, 22.2%, 20.4%, and 19.7% of patients had at least one hospital admission respectively.

Estimates from this study are higher than the aggregate rate at BPHC sites during those same years. As discussed, differences in documentation and missing or incomplete data on hospitalization admissions may have underestimated the rates we observed. Thus, interpretation of findings should be made cautiously.

⁵ Fleishman JA, Gebo KA, Reilly ED, Conviser R, Christopher Mathews W, Todd Korthuis P, Hellinger J, Rutstein R, Keiser P, Rubin H, Moore RD; HIV Research Network. Hospital and outpatient health services utilization among HIV-infected adults in care 2000-2002. *Med Care*. 2005 Sep;43(9 Suppl):III40-52.

PART IV. CONCLUSIONS

Sites reviewed as part of this HIV/AIDS clinical care quality assurance project assume a challenging task in providing medical care to patients who are traditionally disadvantaged and underserved. In examining aggregate data and select measures by demographic subgroups, we have highlighted areas of success as well as potential opportunities for quality improvement.

From 2001 to 2006, overall clinical performance and outcomes have improved across all sites. Clinical performance in areas such as ART management, PCP prophylaxis, and CD4 counts has met national guidelines. An impressive improvement was also observed in patient health outcomes, specifically viral suppression, likely reflecting enhanced ART effectiveness and ART management.

In evaluating aggregate performance on select clinical care measures by demographic subgroups, we found no consistent trends throughout the 6 review years to suggest any disparity in care. While some differences were detected in certain years, most were eliminated by 2006. Thus, further investigation is needed to determine whether these were actual representations of clinical performance, as there may potentially be confounding factors. As appropriate, these findings may be used to inform the development of quality improvement projects targeted towards patient groups that may benefit from additional intervention.

Furthermore, we also presented site-specific performance data to allow for site to site and site to aggregate data comparisons. On many indicators, aggregate performance was quite high and thus no apparent differences were found at individual sites. Some variations in performance by sites were observed for a few indicators, including hepatitis vaccination. However, given the variability in the number of patients sampled at each site, these comparisons should be interpreted cautiously and may not necessarily imply different levels of care across clinics.

Nevertheless, overall improvements in performance and outcome measures between 2001 and 2006 provide evidence of the efficacy of any quality improvement projects or clinical care initiatives implemented during these years. Clinics should recognize their accomplishments, continue existing quality management practices, and adapt systems as appropriate to changing guidelines and patient needs. Clinics may also share best practices, set goals for continued improvement, or identify strategies to sustain the progress achieved.

By continuously monitoring and responding to changes in clinical care performance and patient health outcomes, Boston Public Health Commission funded sites will continue to deliver quality care, reduce disparities, and support optimal health and quality of life for persons living with HIV/AIDS.

ACKNOWLEDGEMENTS

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APPENDIX A

Boston EMA Part A Sites Reviewed

Boston Medical Center
Lowell Community Health Center
Lynn Community Health Center
Martha Eliot Health Center
Greater Lawrence Family Health Center
Great Brook Valley Health Center
Fenway Community Health Center
Zinberg HIV Clinic (Cambridge Health Alliance)
Whittier Street Health Center

East Boston Neighborhood Health Center

(Not reviewed in most recent cycle, 2005 & 2006, and thus not included in this report)

APPENDIX B

Aggregate & Site-Specific Samples by Caseload Size from 2001 to 2006

	2001	2002	2003	2004	2005	2006
Aggregate Sample Size	509	624	657	604	525	496
Site-Specific Sample Size						
Clinic A						L
Clinic B						L
Clinic C						M
Clinic D						M
Clinic E						M
Clinic F						M
Clinic G						L
Clinic H						S
Clinic I						S

*For certain clinical or outcome indicators presented in this report, a smaller number or a subset of the patient sample were used as the denominator. For example, a subset of patients or only those patients who were on ART at last visit were included in the denominator for the clinical indicator “last viral load ≤ 400 ”.

Site names and site-specific sample sizes are not included to preserve anonymity. Instead, sites are arbitrarily assigned a letter code and are categorized by size of caseload as follows:

Small (S) = ≤ 25 patients
Medium (M) = 26-75 patients
Large (L) = > 75 patients