HIV/AIDS CLINICAL CARE QUALITY ASSURANCE PROJECT

Trends in Clinical Performance & Clinical Outcomes in Massachusetts Funded Clinics

2004 to 2008

JSI Research & Training Institute, Inc.

Laureen M Kunches PhD

Nancy E. Reinhalter RN, CCRC

Wendy Chow MPH

Jacqueline Steiner

Joseph Musolino

Lisa R. Hirschhorn MD, MPH

For the Boston Public Health Commission
and
the Massachusetts Department of Public Health

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BACKGROUND

To evaluate performance in HIV clinical services, determine best practices, and identify opportunities for improving care and health outcomes for people living with HIV/AIDS, JSI has conducted biannual reviews of HIV/AIDS primary medical care. Sites have included Boston Public Health Commission (BPHC) HIV/AIDS Services Division and Massachusetts Department of Public Health (MDPH) Office of HIV/AIDS funded clinics. This report describes the clinic and system level results of the most recent data reviews compared to earlier years.

Four cycles of review have been completed yielding a total of nine years of data (2000 – 2008) for participating sites (see Appendix A). Most recent data (2007 – 2008) that is the focus of this report was obtained from 14 sites on nearly 1,000 patients. 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 2007.

Data elements and methods used in this project were adopted from a data collection strategy initially developed by JSI for the MDPH in collaboration with clinics participating in the ACT-Now Program, which was subsequently replaced by Enhanced Medical Management Services (EMMS). JSI nurses and trained research assistants conduct 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 process 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.

Using five years of most recent data (2004 – 2008), we highlight the aggregate clinical performance of all sites reviewed. Using established national treatment guidelines and Institute for Healthcare Improvement (IHI) and HRSA-HAB benchmarks where available, we present aggregate site changes in performance and outcome measures from 2004 to 2008. 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 stratified by patient demographics including gender, place of birth (non-US born vs. US born), and race/ethnicity, to identify potential opportunities for improving care to specific subgroups. Chi-square analyses were used to test for statistical significance. Further, for select clinical and outcome indicators, we display data for each of the 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 2007 and 2008. 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 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 sites on a given indicator. The following formula was used for calculating 95% CI:

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

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

Due to sample size constraints, sites with fewer than 20 patients reviewed were excluded. Based on this criterion, one site is not individually reported or displayed on the 95% CI charts. [Please note that the scale of some 95% CI charts in this report ranges from 50% to 100% to enhance readability.]

POTENTIAL LIMITATIONS

Documentation: As with any medical chart review project, the validity of findings depends on the 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 was incomplete documentation or incomplete data transfers during the conversion period to electronic medical records at some sites.

Population: While patients were randomly selected for observation during the first review cycle, oversampling of patients newly diagnosed with HIV in the selected recent years may have reduced the overall generalizability of results presented. Overall, results on performance measures may be affected for the years in which no new patients were added. There is also a difference between the number of sites included in the first three years shown (2004 – 2006) and the two most recent years. Due to funding constraints, seven sites were not reviewed in the last cycle.

Measures: Although several of the quality measures involve recurring interventions or reassessments of treatment outcomes, a few represent processes that are one-time-only, such as viral hepatitis screening, hepatitis C treatment, and vaccines for hepatitis A, B and pneumococcal infection. During site visits for chart review, the JSI staff provide the clinical staff with a listing of patients found to be lacking in the process measures so that the clinical team can highlight these steps during the patients' future visits. Once these missed interventions have been pointed out, most likely such patients go on to receive them. Therefore, when the continuing cohort of patients is reviewed in the future, the overall increase in the rates of these one-time measures is

expected and should be understood as having been potentially influenced by the chart review process itself.

Analysis: 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 some variability in sample sizes across individual sites, due caution should be exercised when making site to site comparisons.

DEFINITION OF TERMS

The reader should be aware of the following terminology and definitions used in this report:

- "Racial/ethnic minority" --- patients identified as part of any racial/ethnic group *other than* White, non-Hispanic.
- HIV Risk behaviors --- in light of the important differences between gathering risk information from chart review, compared to provider-generated information submitted in HIV/AIDS case reporting (for surveillance purposes), this report does not attempt to recreate the CDC's hierarchy for categorizing risk behaviors. Patients in this report are included in each of the categories noted in the medical record, resulting in multiple risk behaviors in many cases; therefore, comparisons with surveillance data should be made with caution.
- HIV viral suppression and "undetectable" viral load --- due to inconsistent use of ultrasensitive viral load methods among clinics and over time periods, a cut-off of less than 400 copies/ml is used.

COMPARISON OF CHART REVIEW PATIENT SAMPLE & 2008 MASSACHUSETTS EPIDEMIOLOGIC PROFILE

	MA Chart Review Sample (2007/2008)	MA HIV/AIDS Surveillance Data (Living with HIV/AIDS as of 12/31/2008)
Demographics	**(N= 971)**	**(N=17,827)**
Gender		
Male	58%	71%
Female	42%	29%
Age		
<25	2%	3%
25-49	67%	63%
50+	31%	34%
Race/ethnicity		
Hispanic	31%	25%
White non-Hispanic	33%	45%
Black non-Hispanic	33%	28%
Asian/PI	2%	1%
Other/Unknown	1%	1%
Place of Birth		
US Born	46%	68%
Puerto Rico/US Dependency	13%	12%
Non-US Born	41%	20%

To evaluate the representativeness of our sample, we compared the chart review demographics to the epidemiologic profile of people living with HIV/AIDS as of the end of 2008 in the state using data from the Massachusetts HIV/AIDS surveillance program.

The proportion of males in the chart review sample was smaller relative to the surveillance population in 2008. There were only slight differences in the distributions of patients by race/ethnicity, with a larger proportion of PLWHA who were White non-Hispanic in the state than in the chart review sample. Similar distributions were found in the age category. The proportion of non-US born patients was larger in the chart review sample compared to the surveillance population in 2008.

REPORT OUTLINE

This report summarizes:

1) Annual data on select clinical performance measures from 2004 to 2008 for all patients diagnosed on or before December 31, 2007, who were alive with at least two visits at the end of a given review year.
    - Aggregate sites' clinical performance between 2004 and 2008
    - Aggregate sites' clinical performance between 2004 and 2008 by select demographic subgroups (gender, place of birth: non-US born vs. US born, and race/ethnicity) with p-values where statistically significant
    - Comparisons among sites and aggregate sites: 95% CI

2) Annual data on select outcome measures including viral load, CD4 count, and all-cause hospitalizations
    - Outcome measures for aggregate sites between 2004 and 2008 by select demographic subgroups (gender, place of birth: non-US born vs. US born, race/ethnicity) with p-values where statistically significant
    - Comparisons among sites and aggregate sites: 95% CI

Data presented include all patients reviewed who were diagnosed on or before December 31, 2007, alive at the end of the year, with at least two visits during the review year.

Patients who were newly enrolled in the last six months of the review year were excluded as they would not have been in care long enough to necessarily meet the performance standard.

In the report for distribution to individual clinics, site names 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

PART I. 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 Group 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
- *Pneumocystis jiroveci* pneumonia (formerly called *pneumocystis carinii* pneumonia, referred to as PCP) prophylaxis for patients with CD4 cell count < 200 cells/mm^3
- Antiretroviral Therapy (ART) Management
    - On ART when patient met CD4 count or viral load eligibility criteria during the year of review
- Pregnant women with HIV on ART

Other indicators collected are similar process measures to HAB Measures Group 2 and 3, including:

- 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)
- Pneumococcal vaccine 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/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, 2007, alive at the end of the year, with at least two visits during the review year.

Patients who were newly enrolled in the last six months of the review year were excluded as they would not have been in care long enough to necessarily meet the performance standard.

[1] HRSA HAB HIV Core Clinical Performance Measures for Adult/Adolescents:
Group 1: ftp://ftp.hrsa.gov/hab/habGrp1PMs08.pdf,
Group 2: ftp://ftp.hrsa.gov/hab/habGrp2PMs08.pdf,
Group 3: ftp://ftp.hrsa.gov/hab/PMgroup3.pdf

A. CLINICAL PERFORMANCE MEASURES
Aggregate 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 1. Percentage of Patients with Visits in 2 or more 4-month periods, Aggregate & by Subgroup

	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites Seen in ≥ TWO 4-month periods	93%	90%	94%	91%	92%
By Gender					
Male	93%	**90%** (p=0.002)	94%	89%	87%
Female	94%	**95%**	96%	91%	89%
By Place of Birth					
U.S. Born	**93%** (p=0.01)	92%	94%	90%	88%
Non-US Born	**97%**	91%	95%	89%	88%
By Race/Ethnicity					
Minority	94%	**90%** (p=0.08)	**96%**	89%	88%
White non-Hispanic	94%	**93%**	**93%** (p=0.02)	91%	87%
Hispanic	93%	91%	97%	88%	90%
Black non-Hispanic	94%	89%	94%	90%	87%
Asian/PI	95%	95%	100%	75%	78%
Other	100%	100%	93%	91%	93%

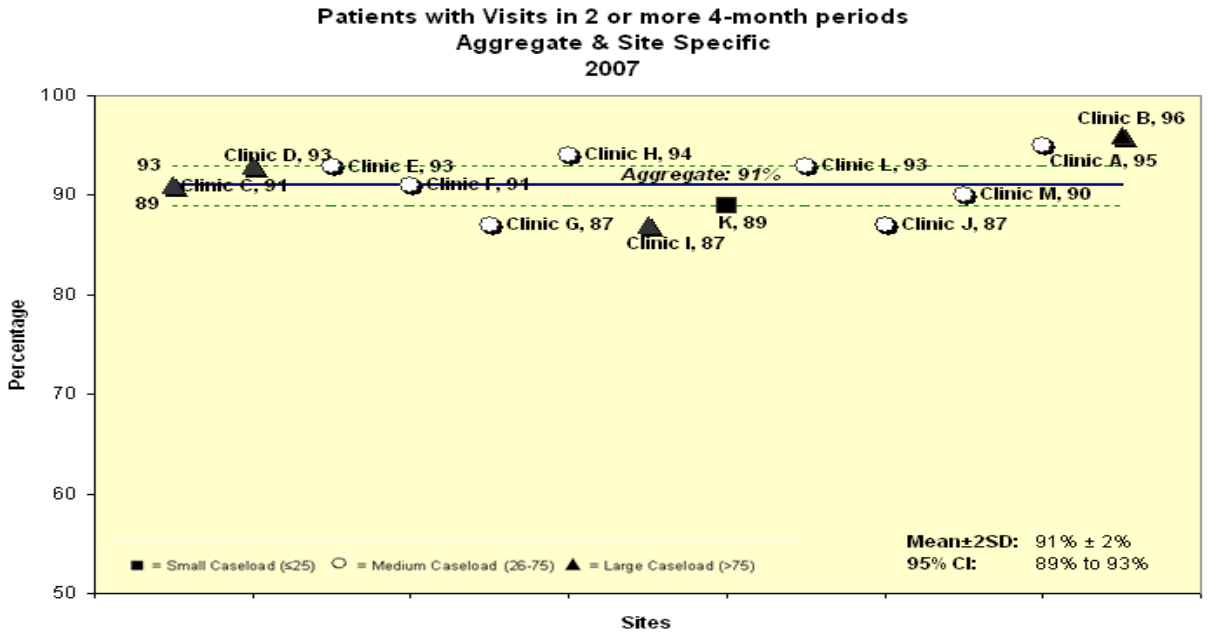
During these years, at least 90% of all patients reviewed at sites had visits in at least two trimesters with an HIV medical provider with prescribing privileges. No difference was found between genders in this measure for most years. In 2004, the difference by place of birth was

statistically significant, with non-US born patients being more likely to have regular visits than US born individuals. In 2006, there was a significant difference between White non-Hispanic patients and minority patients, with minority patients having a higher rate of having visits in at least two trimesters. During 2007 and 2008, however, there appeared to be no significant differences by place of birth or race/ethnicity.

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

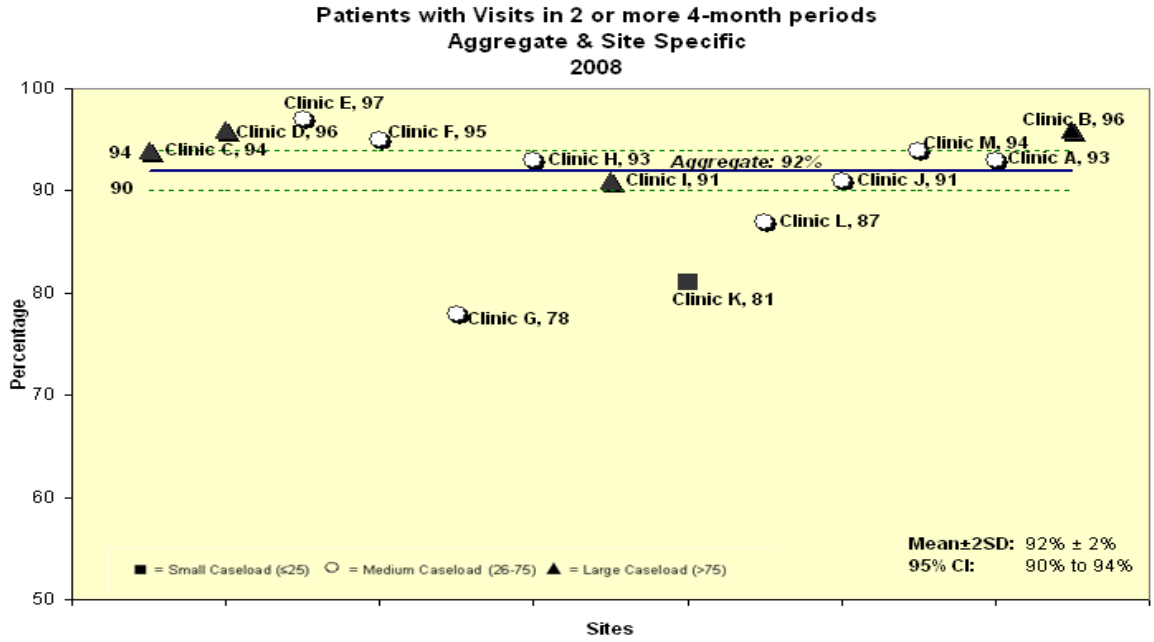
	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites Seen in ≥ TWO 4-month periods	93%	91%	94%	91%	92%
By Site					
Clinic A	98%	98%	100%	95%	93%
Clinic B	95%	92%	96%	96%	96%
Clinic C	94%	88%	92%	91%	94%
Clinic D	95%	94%	96%	93%	96%
Clinic E	94%	81%	93%	93%	97%
Clinic F	97%	90%	96%	91%	95%
Clinic G	97%	85%	96%	87%	78%
Clinic H	79%	97%	94%	94%	93%
Clinic I	92%	95%	95%	87%	91%
Clinic J	97%	95%	94%	87%	91%
Clinic K	79%	100%	85%	89%	81%
Clinic L	97%	91%	97%	93%	87%
Clinic M	94%	92%	90%	90%	94%

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.



In 2007, the aggregate mean percentage of patients with medical visits in two or more four-month periods was 91% (95% CI: 89% to 93%). Based on the 95% confidence interval, Clinic G, Clinic I, and Clinic L patients tended to have less consistent medical visits with a provider compared to all sites in 2007. Patients at Clinic B, Clinic H and Clinic A were more likely to have visits in at least two trimesters compared to all sites.

In 2008, the aggregate mean percentage of patients with medical visits in two or more four-month periods was 92% (95% CI: 90% to 94%). Clinic D, Clinic E, Clinic F, and Clinic B patients were more likely to have consistent medical visits with a provider compared to patients at all sites; Clinic J, Clinic K and Clinic G were found to have lower rates.



****Note: The scale of some 95% CI charts ranges from 50% to 100% to enhance readability.*

CD4 COUNTS

According to Department of Health and Human Services (DHHS), monitoring of CD4 cell 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 Public Health Service (USPHS) 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 two or more CD4 counts in a year that are at least three 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 clinics. Proportions shown below represent patients meeting this criterion.

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

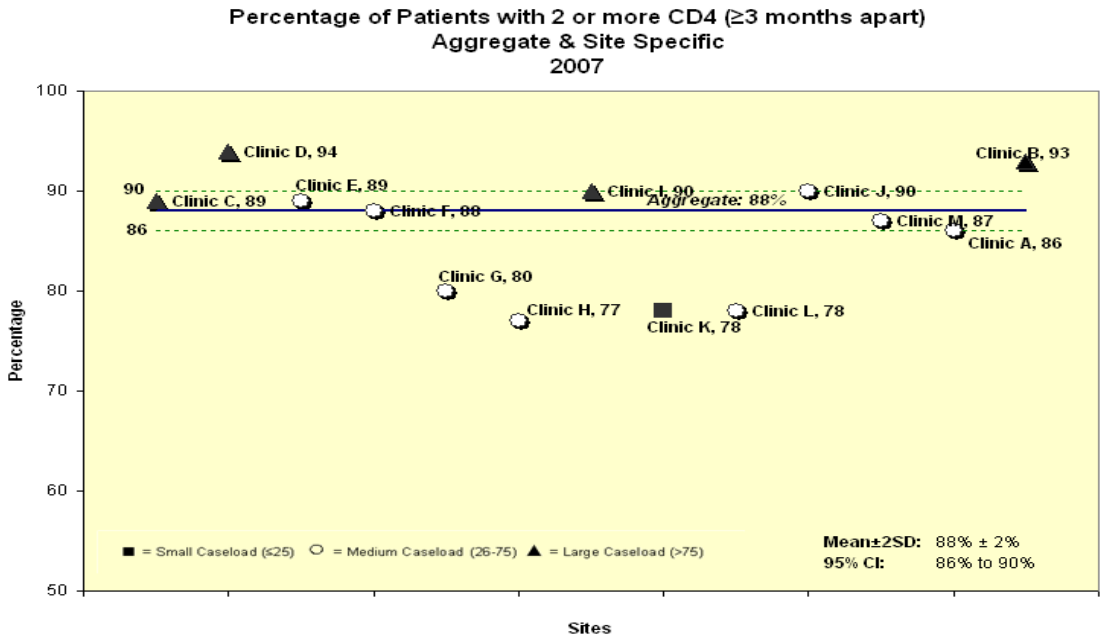
	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites					
2 or more CD4s, ≥ 3 months apart	86%	85%	86%	88%	87%
By Gender					
Male	85%	86%	88%	88%	88%
Female	86%	85%	84%	88%	86%
By Place of Birth					
U.S. Born	84%	86%	86%	86%	85%
Non-US Born	90%	85%	88%	90%	91%
By Race/Ethnicity					
Minority	85%	**83%** (p=0.05)	86%	87%	88%
White non-Hispanic	87%	**88%**	87%	88%	87%
Hispanic	81%	**85%**	85%	86%	84%
Black non-Hispanic	88%	**80%** (p=0.006)	86%	88%	91%
Asian/PI	89%	**95%**	95%	93%	93%
Other	86%	**94%**	93%	82%	93%

Between 85% and 88% of all patients reviewed at these sites had two or more CD4 counts that were at least three months apart from 2004 to 2008. No differences in number of CD4 counts were found by gender or place of birth. However, in 2005, a racial difference was noted in which minority patients as a group and Black non-Hispanic patients as a subgroup had significantly lower testing rates.

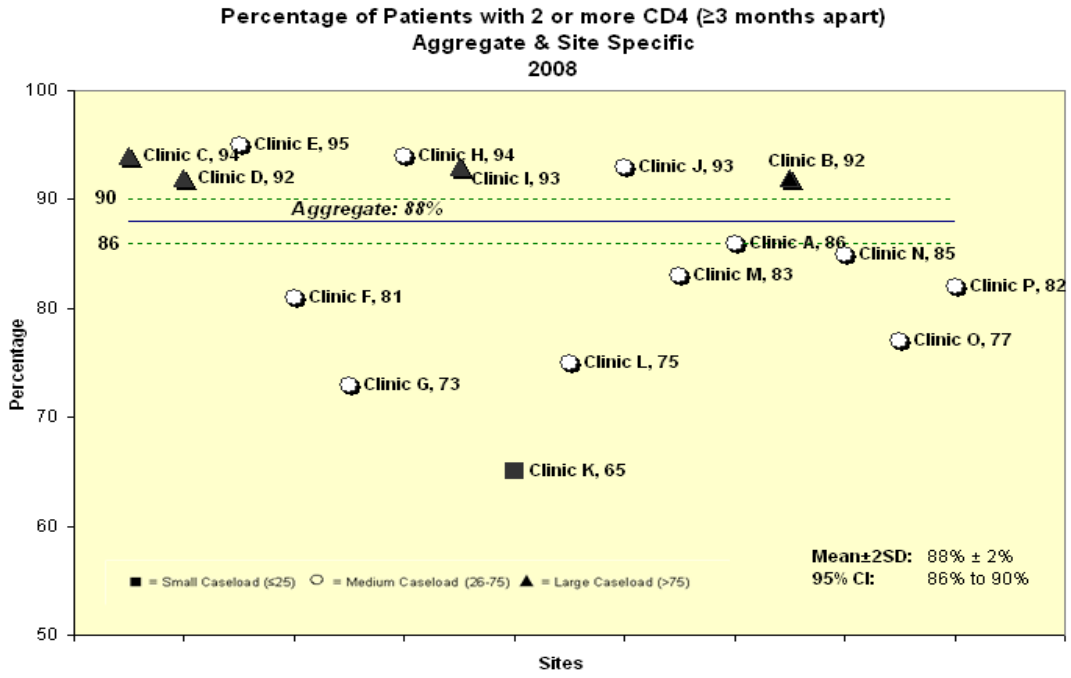
Table 4. Percentage of Patients with 2 or more CD4 (≥ 3 months apart), Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites					
2 or more CD4s, ≥ 3 months apart	86%	85%	86%	88%	88%
By Site					
Clinic A	84%	90%	89%	86%	86%
Clinic B	95%	95%	94%	93%	92%
Clinic C	88%	51%	85%	89%	94%
Clinic D	90%	94%	93%	94%	92%
Clinic E	89%	84%	79%	89%	95%
Clinic F	80%	83%	90%	88%	81%
Clinic G	96%	77%	83%	80%	73%
Clinic H	79%	79%	77%	77%	94%
Clinic I	91%	96%	92%	90%	93%
Clinic J	85%	92%	84%	90%	93%
Clinic K	68%	90%	65%	78%	65%
Clinic L	52%	55%	54%	78%	75%
Clinic M	89%	93%	82%	87%	83%

In the table above, we present the percentage of patients with undetectable last viral loads each year by site. Low testing rates were associated with a technological error at Clinic C, when data were not populating the electronic medical record for a period in 2005. Clinic K's rate reflects the lead physician's practice preferences and the Clinic J rates may be due to the small numbers and the model of shared patient management with a tertiary care center.



In 2007, the aggregate mean percentage of patients with two or more CD4 counts that were at least three months apart was 88% (95% CI: 86% to 90%). Based on the 95% confidence interval, Clinic D and Clinic B patients were more likely to have regular CD4 counts than all patients reviewed in 2007. In 2007, Clinic G, Clinic H, Clinic J and Clinic K patients were less likely to have regular CD4 counts compared to all sites.



In 2008, the aggregate mean percentage of patients with two or more CD4 counts that were at least three months apart was 88% (95% CI: 86% to 90%). In 2008, patients at Clinic C, Clinic E, Clinic D, Clinic I, Clinic L, Clinic B and Clinic H tended to have regular CD4 counts compared to all sites, while patients at Clinic F, Clinic G, Clinic J, Clinic M and Clinic K were less likely to have regular CD4 counts compared to all sites.

PCP PROPHYLAXIS

Pneumocystis jiroveci pneumonia (formerly called *pneumocystis carinii* pneumonia, referred to as PCP) is an opportunistic infection that is preventable with appropriate use of PCP prophylaxis when indicated. USPHS guidelines state that all patients should receive PCP prophylaxis when a 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 three 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 5. Percentage of Patients on PCP prophylaxis (among eligible), Aggregate & by Subgroups

	2004	2005	2006	2007	2008
Total Sample Size (PCP prophylaxis eligible)	n=293	n=242	n=226	n=215	n=205
Aggregate Sites On prophylaxis (of eligible)	96%	89%	91%	92%	89%
By Gender					
Male	97%	90%	92%	91%	90%
Female	94%	88%	94%	95%	89%
By Place of Birth					
U.S. Born	95%	90%	92%	**88%** (p=0.02)	88%
Non-US Born	97%	89%	95%	**98%**	93%
By Race/Ethnicity					
Minority	95%	89%	92%	94%	89%
White non-Hispanic	**97%**	90%	93%	89%	90%
Hispanic	**95%** (p=0.02)	86%	94%	93%	92%
Black non-Hispanic	**97%**	93%	90%	94%	86%
Asian/PI	**100%**	100%	75%	100%	100%
Other	**100%**	67%	100%	100%	100%

Prescription of PCP prophylaxis for eligible patients at all sites reviewed in this project was impressively high overall, ranging from 89% to 96%. Further, as illustrated in the table above, there appears to be no significant differences in rates of being on PCP prophylaxis among eligible patients except in 2004 by race/ethnicity, with Hispanic patients having a lower rate (95%). In 2007 and 2008 respectively, 8% (17/198) and 11% (19/186) 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 for these patients, 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 (ART) for all patients with a diagnosis of AIDS (CD4 count < 200 cells/mm^3 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 have occasionally changed, so the guidelines in place during the year of review were always used as the criteria for determining treatment eligibility. The IHI target for this performance measure is for at least 90% of all patients eligible for ART to be prescribed ART.

Table 6. Percentage of Patients on ART (among eligible), Aggregate & by Subgroups

	2004	2005	2006	2007	2008
Total Sample Size (ART eligible)	n=942	n=932	n=903	n=816	n=849
Aggregate Sites % On ART (of ART indicated)	94%	94%	95%	95%	96%
By Gender					
Male	94%	92%	95%	95%	96%
Female	94%	95%	94%	93%	96%
By Place of Birth					
U.S. Born	93%	93%	95%	94%	**95%** (p=0.003)
Non-US Born	95%	94%	96%	95%	**99%**
By Race/Ethnicity					
Minority	95%	**95%** (p=0.02)	95%	94%	96%
White non-Hispanic	92%	**91%**	95%	96%	96%
Hispanic	96%	**94%** (p=0.004)	95%	92%	97%
Black non-Hispanic	94%	**96%**	95%	95%	96%
Asian/PI	100%	**100%**	100%	100%	100%
Other	100%	**70%**	75%	88%	89%

As a group, all 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, non-US born patients tended to have higher rates of being on ART than U.S. born patients, and in 2008 this difference was significant. In 2005, racial/ethnic minorities were also more likely to be on ART than White non-Hispanic patients.

In both 2007 (45/816) and 2008 (35/814), about 5% of patients eligible for ART were not on ART. Progress notes indicated that ART was discussed with 94% of these patients. In 2005, of the patients not on ART where clinically indicated, 43% (15/35) refused ART. In 2008, 18% (7/39) refused treatment. Of the remaining patients eligible but not on ART, clinical notes revealed that treatment initiation was in progress. In most cases, treatment was pending further

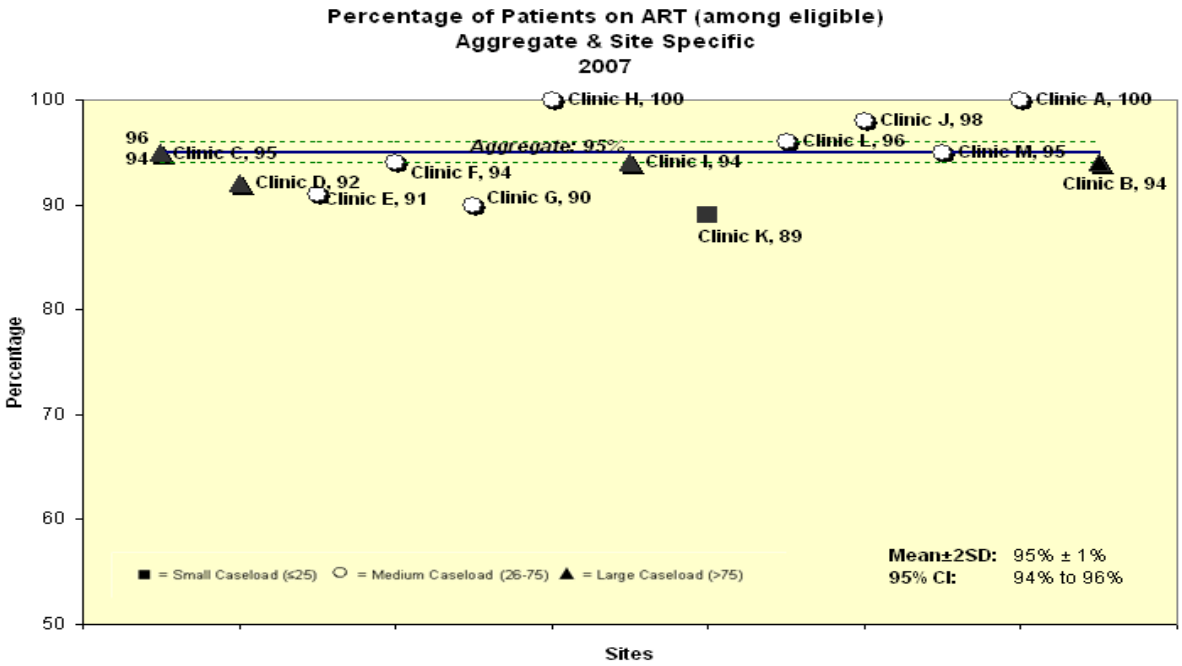
examination of CD4 or viral load laboratory results or stabilization of concurrent medical problems (including substance abuse, psychiatric illness, or medical care non-compliance).

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, all were on ART. Some pregnancies were terminated and thus ART was not indicated.

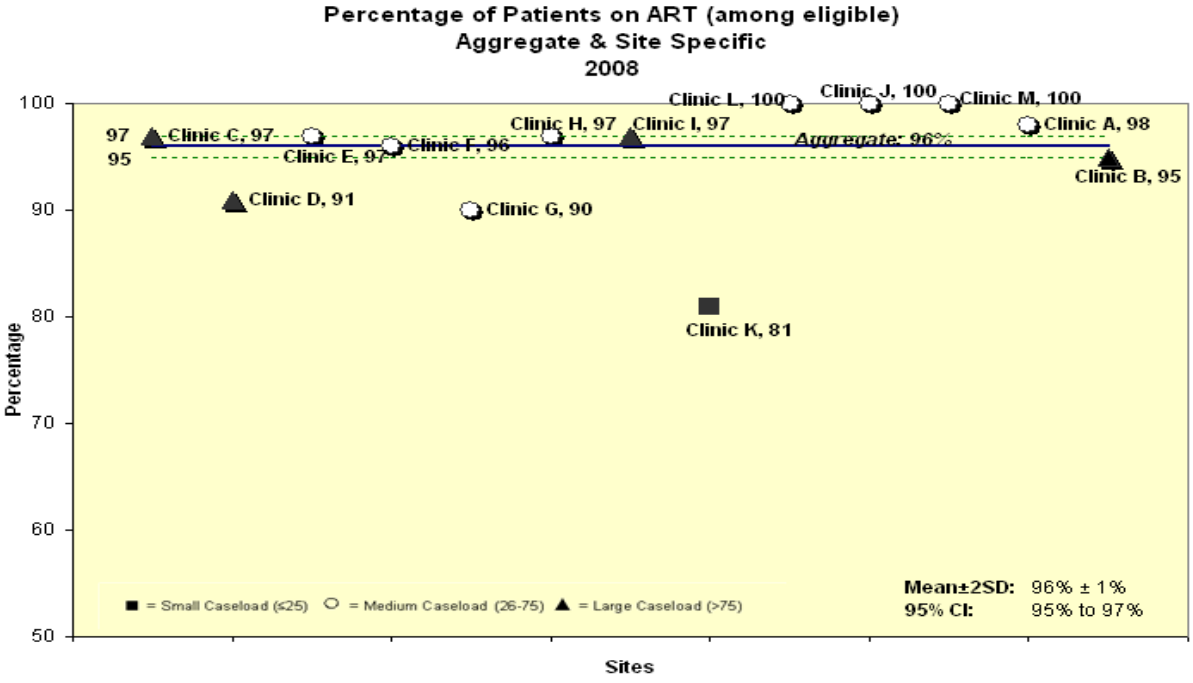
Table 7. Percentage of Patients on ART (among eligible), Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size	n=942	n=932	n=903	n=816	n=849
Aggregate Sites					
On ART (of ART indicated)	94%	94%	95%	95%	96%
By Site					
Clinic A	94%	87%	92%	100%	98%
Clinic B	94%	90%	94%	94%	95%
Clinic C	94%	97%	97%	95%	97%
Clinic D	89%	86%	88%	92%	91%
Clinic E	94%	92%	100%	91%	97%
Clinic F	97%	95%	91%	94%	96%
Clinic G	91%	91%	95%	90%	90%
Clinic H	88%	96%	92%	100%	97%
Clinic I	90%	89%	91%	94%	97%
Clinic J	98%	96%	98%	98%	100%
Clinic K	79%	95%	89%	89%	81%
Clinic L	90%	93%	100%	96%	100%
Clinic M	92%	100%	98%	95%	100%

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



In 2007, the aggregate mean percentage of patients who were on ART among those eligible was 95% (95% CI: 94% to 96%). Based on the 95% confidence interval, Clinic J, Clinic G, and Clinic D tended to have a lower proportion of patients who were on ART when clinically indicated in 2007 and in 2008. In 2007, Clinic H, Clinic A, Clinic L, and Clinic K tended to have a higher proportion of patients who were on ART when clinically indicated.



In 2008, the aggregate mean percentage of eligible patients on ART was 96% (95% CI: 95% to 97%). Clinic C, Clinic E, Clinic H, Clinic I, Clinic K, Clinic L, Clinic M, and Clinic A 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 2004-2008 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 nine clinics located in seven 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 sites reviewed were much more likely to have had received at least one dose of hepatitis B or hepatitis A vaccination.

[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.

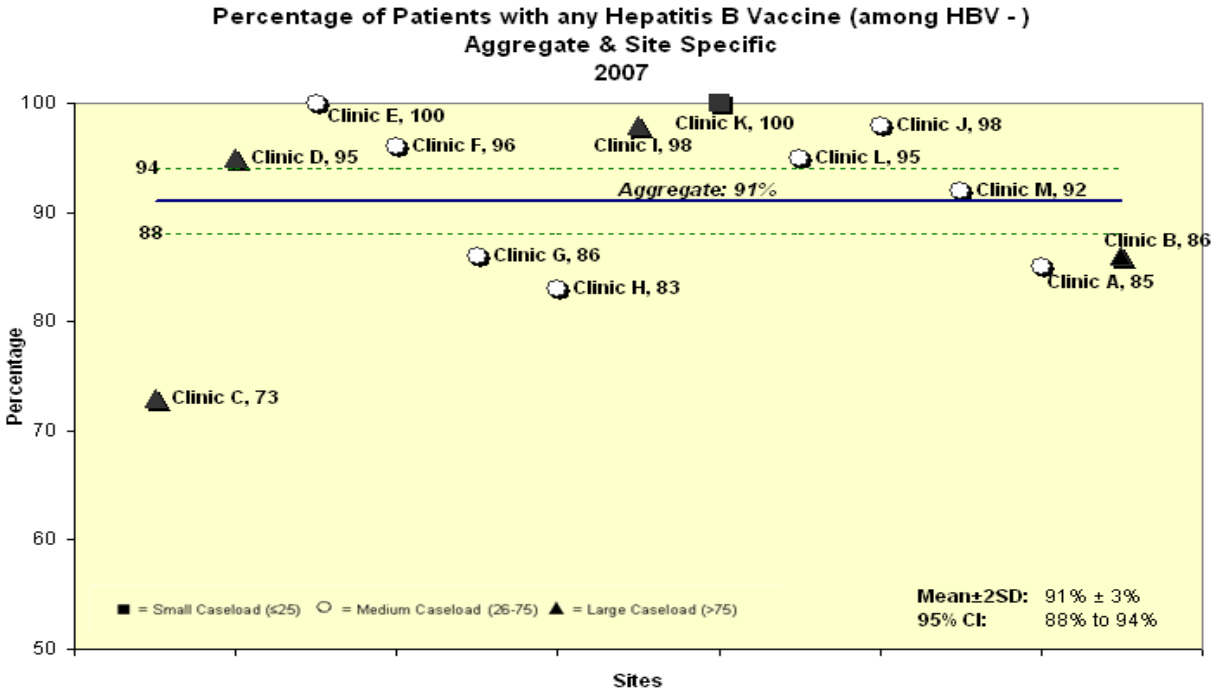
Table 8. Percentage of Patients with any Hepatitis B Vaccine (among HBV-), Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size (HBV-)	n=525	n=546	n=508	n=484	n=484
Aggregate Sites Any Hepatitis B Vaccine	88%	89%	87%	91%	91%
By Site					
Clinic A	76%	76%	76%	85%	79%
Clinic B	80%	71%	75%	86%	88%
Clinic C	63%	70%	69%	73%	72%
Clinic D	90%	91%	86%	95%	95%
Clinic E	100%	100%	100%	100%	93%
Clinic F	87%	89%	86%	96%	96%
Clinic G	90%	88%	90%	86%	80%
Clinic H	90%	90%	77%	83%	88%
Clinic I	77%	79%	79%	98%	100%
Clinic J	88%	93%	94%	98%	93%
Clinic K	100%	100%	100%	100%	100%
Clinic L	36%	45%	47%	95%	95%
Clinic M	81%	85%	82%	92%	92%

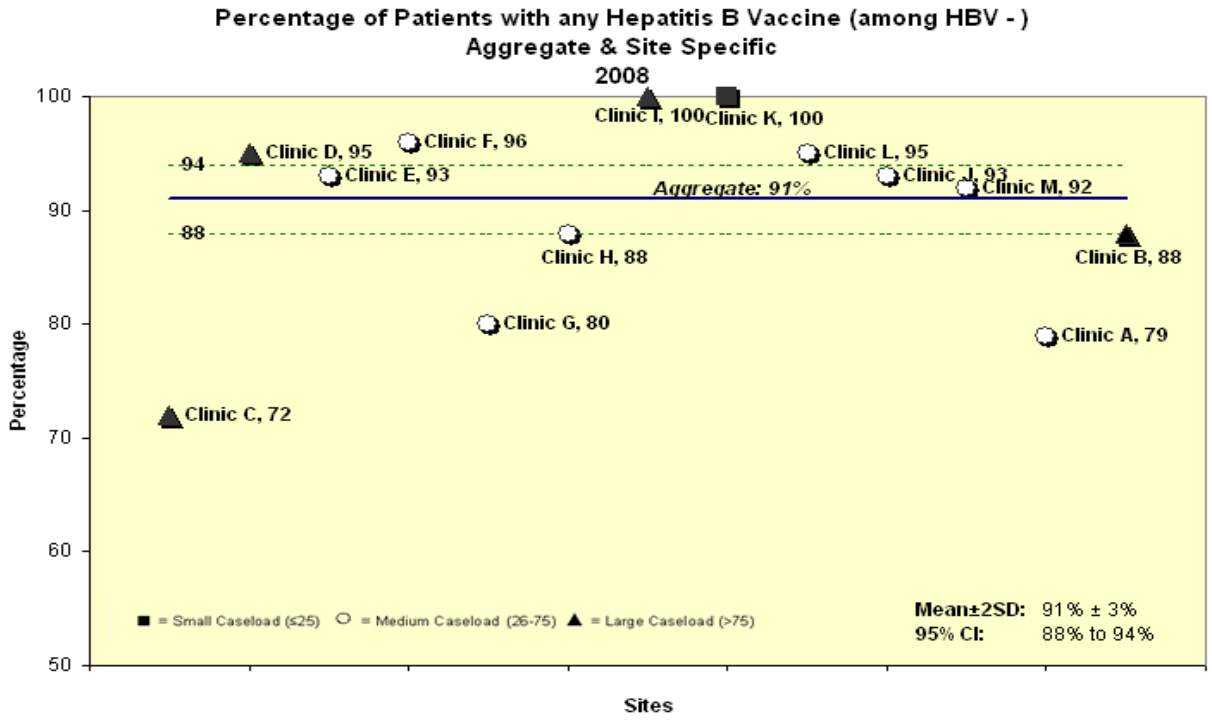
In the preceding table, we provide rates of receipt of at least one dose of HBV vaccination among patients who have had no evidence of prior HBV infection on screening across all sites reviewed. Between 87% and 91% of all eligible patients had ever received any HBV vaccine during the period. At the site level, a few clinics had relatively lower rates of providing HBV vaccinations, but one (Clinic K) took steps to improve their rates dramatically after receiving the early data. Others have been encouraged to track this intervention more closely.

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

[3] HRSA HAB HIV Core Clinical Performance Measures for Adult/Adolescents:
Group 1: ftp://ftp.hrsa.gov/hab/habGrp1PMs08.pdf,
Group 2: ftp://ftp.hrsa.gov/hab/habGrp2PMs08.pdf,
Group 3: ftp://ftp.hrsa.gov/hab/PMgroup3.pdf



The aggregate mean percentage of patients with documented receipt of any dose of hepatitis B vaccine among those HBV negative was 91% (95% CI: 88% to 94%) in 2007 and in 2008. In both years, Clinic D, Clinic E, Clinic F, Clinic I, Clinic K, Clinic L, and Clinic M were more likely to have patients with any hepatitis B vaccine compared to all sites. However, Clinic C, Clinic G, Clinic H, Clinic B, and Clinic A tended to have a lower percentage of patients (HBV-) with documented receipt of any dose of hepatitis B vaccine.



HEPATITIS A SCREENING AND VACCINATION

Hepatitis A screening rates are lower across all sites relative to hepatitis B and C screening. Between 71% and 81% of all patients reviewed in 2004-2008 had ever been screened for HAV.

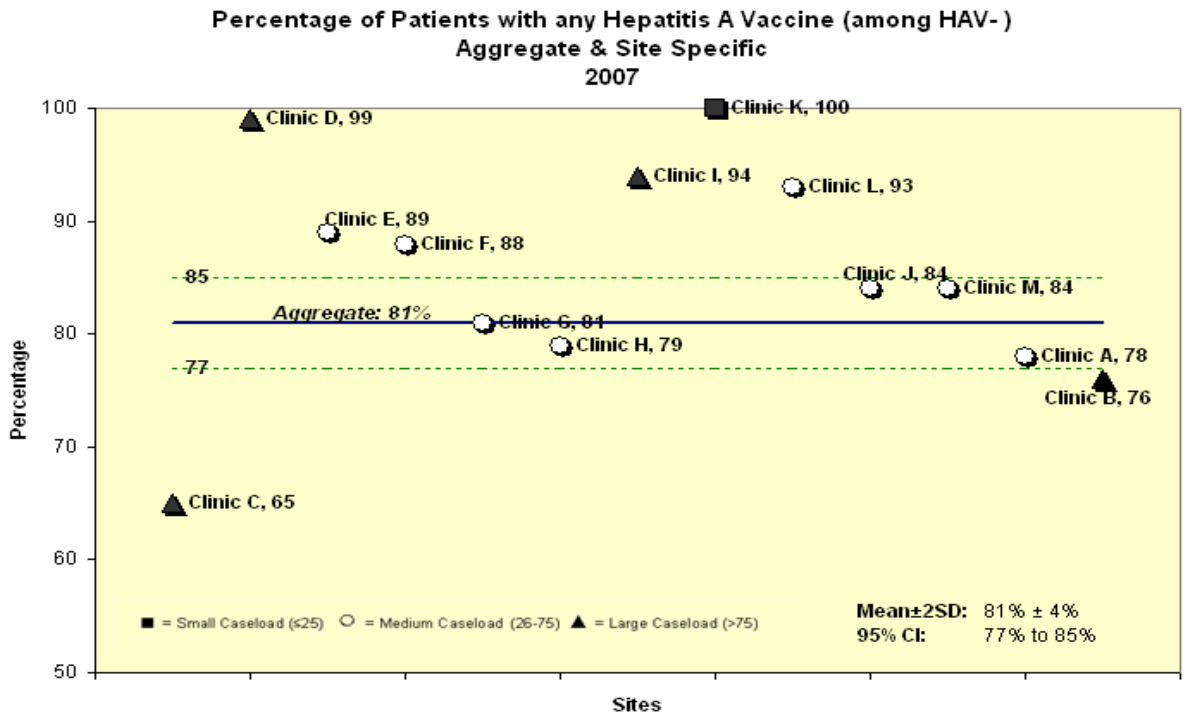
As described above, in 2004, the HIV Outpatient Study (HOPS) published a report on the rates of hepatitis A and hepatitis B vaccination among eligible patients in a sample of HIV patients receiving care at nine clinics located in seven US cities. In this study, about 23% of eligible patients had documented receipt of ≥1 dose of hepatitis A vaccine.

Table 9. Percentage of Patients with any Hepatitis A Vaccine (among HAV-), Aggregate & Site-Specific

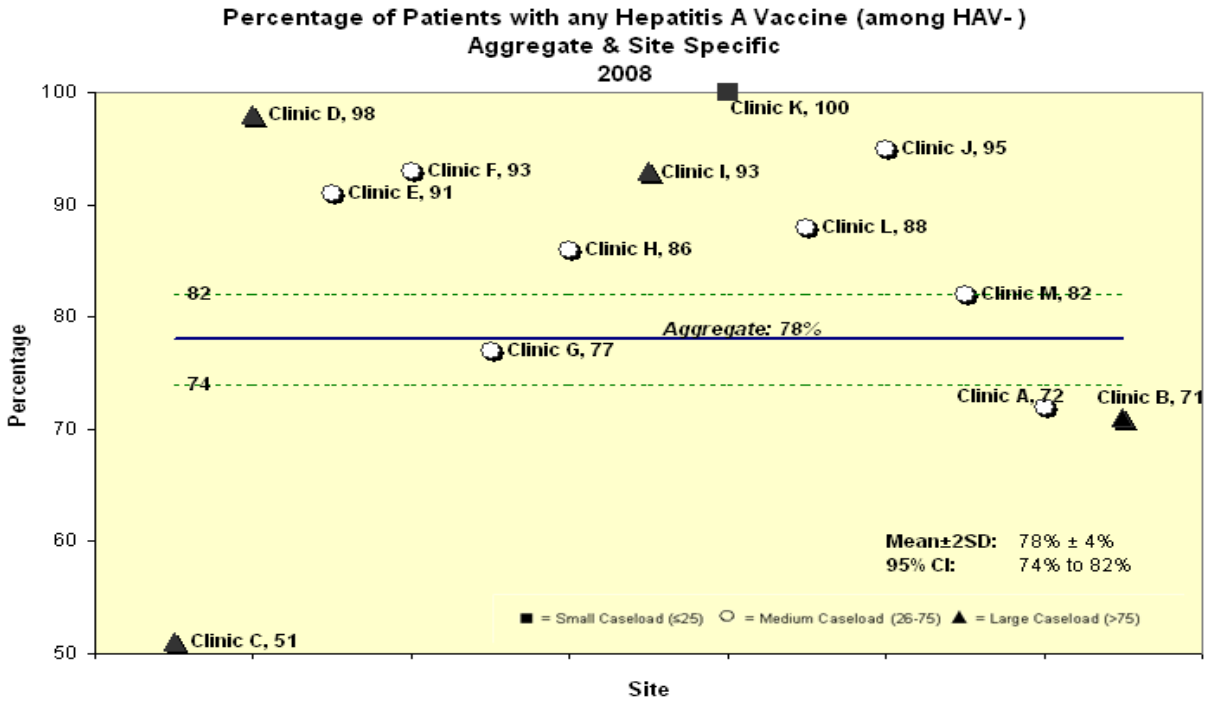
	2004	2005	2006	2007	2008
Total Sample Size (HAV-)	n=517	n=517	n=487	n=402	n=396
Aggregate Sites Any Hepatitis A Vaccine	71%	71%	71%	81%	78%
By Site					
Clinic A	54%	50%	58%	78%	72%
Clinic B	74%	61%	63%	76%	71%
Clinic C	45%	53%	49%	65%	51%
Clinic D	93%	94%	95%	99%	98%
Clinic E	63%	67%	67%	89%	91%
Clinic F	66%	64%	70%	88%	93%
Clinic G	95%	84%	88%	81%	77%
Clinic H	71%	79%	67%	79%	86%
Clinic I	79%	79%	79%	94%	93%
Clinic J	93%	85%	87%	84%	95%
Clinic K	89%	88%	100%	100%	100%
Clinic L	41%	45%	48%	93%	88%
Clinic M	56%	50%	50%	84%	82%

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 2007 and 2008.

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.



The aggregate mean percentage of HAV negative patients with any dose of hepatitis A vaccination was 81% (95% CI: 77% to 85%) in 2007 and was 78% (95% CI: 74% to 82%) in 2008. Among eligible patients (HAV-), those at several clinics were above average in both years. Clinic C and Clinic B had a lower proportion of patients (HAV-) with documented receipt of any hepatitis A vaccine in both 2007 and 2008.



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 not receiving treatment.

Table 10. Percentage of Patients who ever had HCV treatment (among HCV+), Aggregate

	2004	2005	2006	2007	2008
HCV Positive	35%	33%	32%	28%	27%
Potential candidates for HCV treatment	n=320	n=292	n=270	n=189	n=184
Aggregate Sites HCV treatment (Ever, of candidates)	15%	20%	21%	17%	19%
By Site					
Clinic A	0%	0%	0%	0%	0%
Clinic B	17%	10%	24%	23%	26%
Clinic C	6%	28%	32%	10%	13%
Clinic D	60%	80%	67%	50%	50%
Clinic E	17%	22%	44%	44%	44%
Clinic F	23%	22%	24%	36%	36%
Clinic G	13%	15%	11%	15%	25%
Clinic H	14%	17%	0%	0%	0%
Clinic I	29%	30%	30%	5%	5%
Clinic J	11%	13%	0%	0%	0%
Clinic K	9%	33%	25%	0%	0%
Clinic L	25%	22%	24%	29%	30%
Clinic M	10%	22%	26%	11%	13%

The proportion of patients with hepatitis C infection declined throughout the eight year period from 39% in 2001 to 27% in 2008. Among patients who were HCV antibody positive each year, the rate of ever having received HCV treatment ranged from 15-21%. Experience of providers with HCV combination therapy of oral ribavirin and pegylated interferon has increased during this time period, but many patients refuse this difficult therapy.

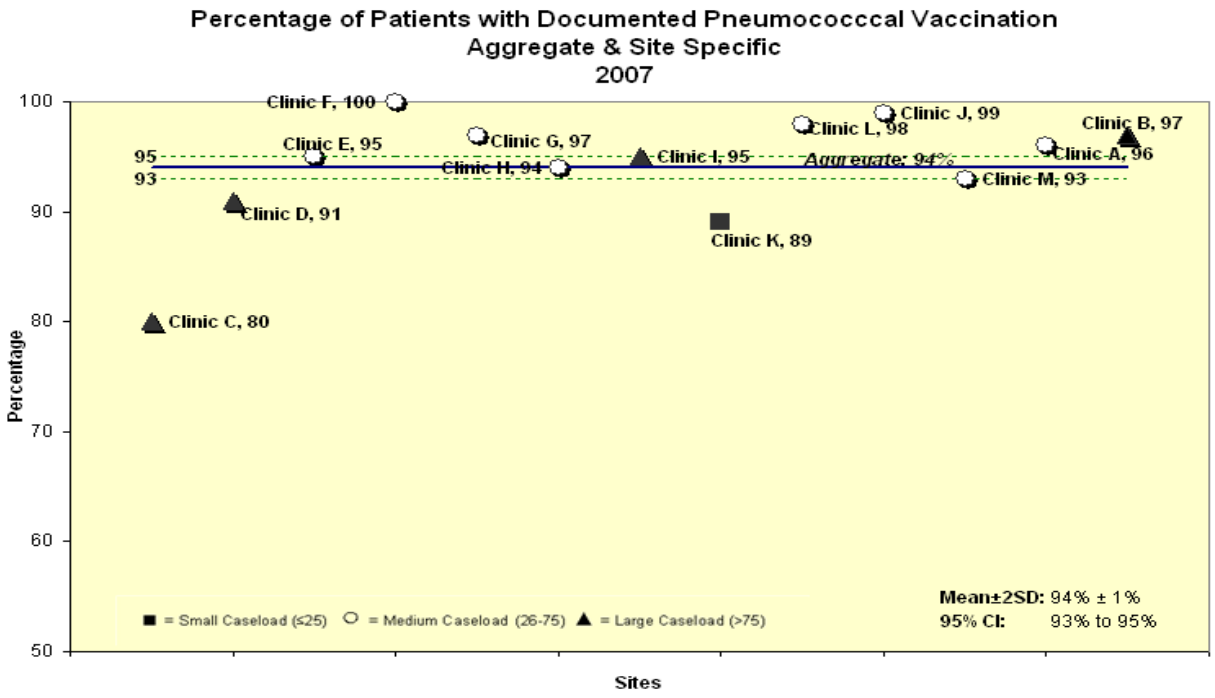
PNEUMOCOCCAL VACCINATION

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 in this analysis.

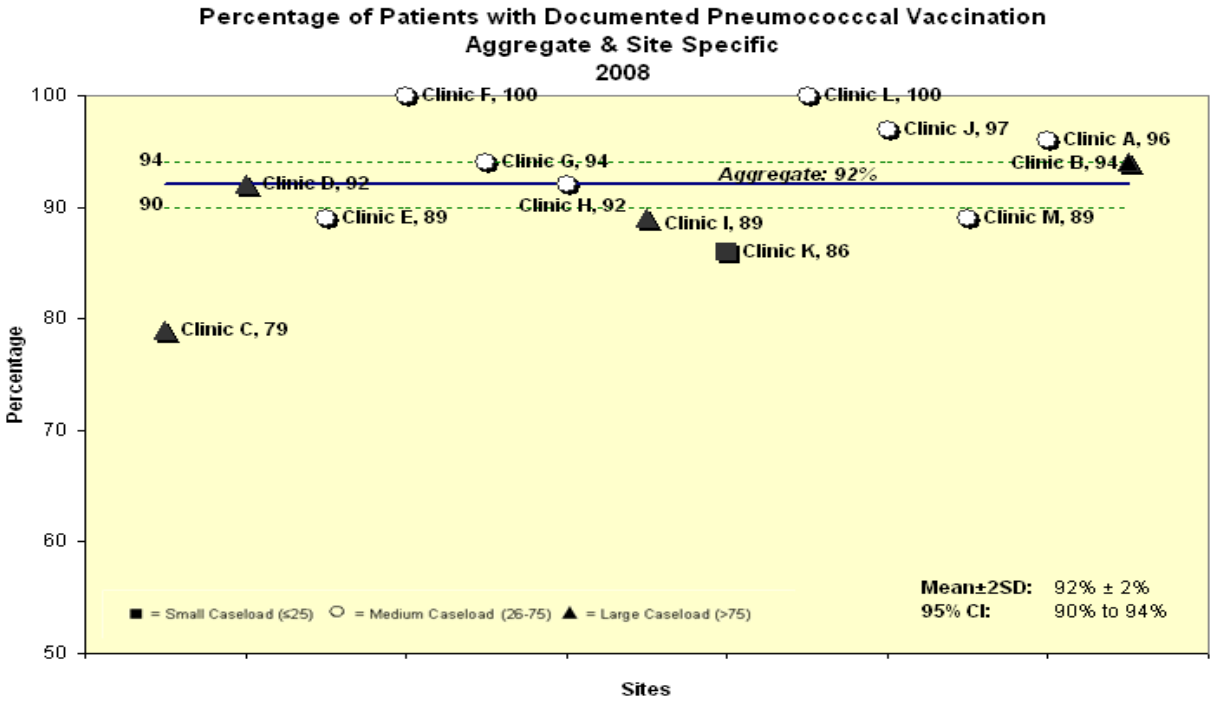
Table 11. Percentage of Patients with Documented Pneumococcal Vaccination, Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites					
Pneumovax	92%	92%	92%	94%	92%
By Site					
Clinic A	95%	93%	94%	96%	96%
Clinic B	93%	89%	87%	97%	94%
Clinic C	83%	82%	84%	80%	79%
Clinic D	90%	90%	87%	91%	92%
Clinic E	97%	92%	90%	92%	90%
Clinic F	93%	97%	98%	95%	89%
Clinic G	96%	97%	96%	97%	94%
Clinic H	97%	100%	87%	94%	92%
Clinic I	92%	89%	87%	95%	89%
Clinic J	98%	96%	97%	99%	97%
Clinic K	93%	95%	100%	89%	86%
Clinic L	94%	94%	93%	98%	100%
Clinic M	97%	97%	95%	93%	89%

More than 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 except Clinic C.



The aggregate mean percentage of patients who had ever received a pneumococcal vaccine was 94% (95% CI: 93% to 95%) in 2007 and 92% (95% CI: 90% to 94%) in 2008. In both years, Clinic F, Clinic K, and Clinic L patients were more likely to have ever received a pneumococcal vaccine compared to all sites. However, Clinic C patients were less likely to have documented receipt of a pneumococcal vaccine compared to patients at all sites.



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 six year period, we used receipt of a documented Pap smear in the year as the indicator, 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 Group 2 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 and DPH sites.

Table 12. Percentage of Patients Receiving Pap Smears, Rates of Abnormal Pap, and Referrals

	2004	2005	2006	2007	2008
Total Females	n=439	n=417	n=403	n=370	n=371
Pap Smears	62%	69%	63%	67%	60%
% Abnormal Pap	27%	18%	20%	18%	17%
% Referred of Abnormal Paps	76%	98%	95%	100%	99%

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

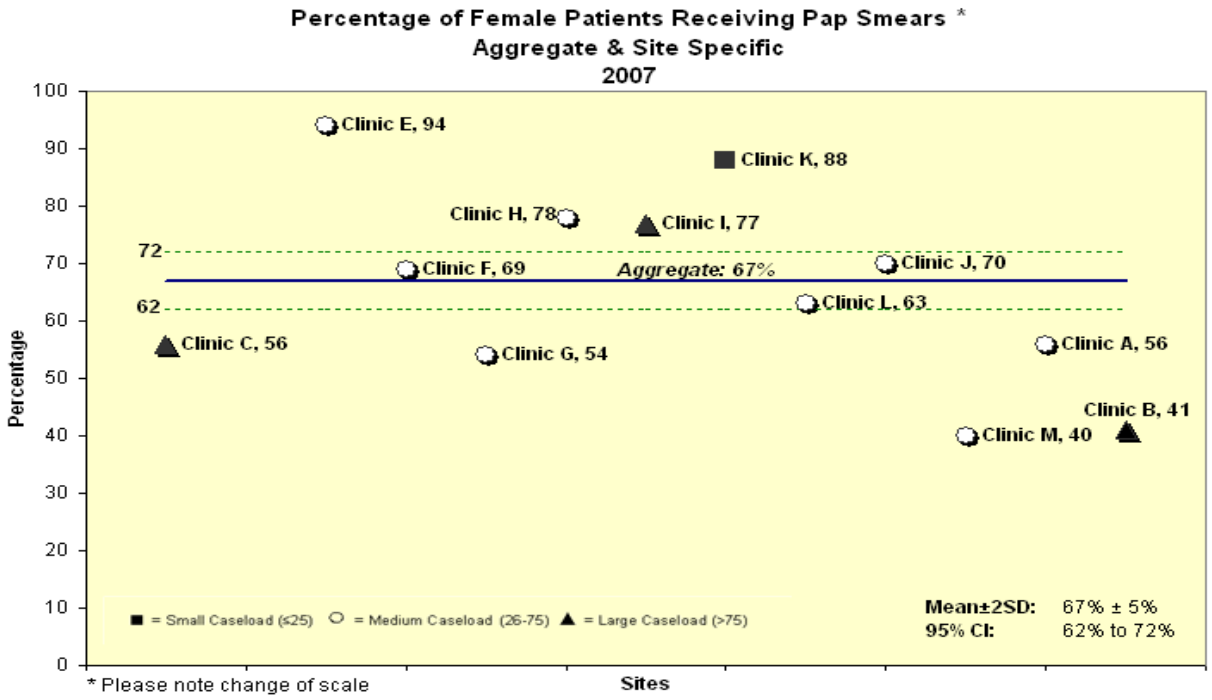
Between 60% and 69% of all female patients in our sample had received a Pap smear during each review year over the 5-year period; about 20% of Pap smears were abnormal. Referral rates for abnormal Pap smears were generally high ranging from 76% to 100% across all sites during this period.

[4]Stein 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.

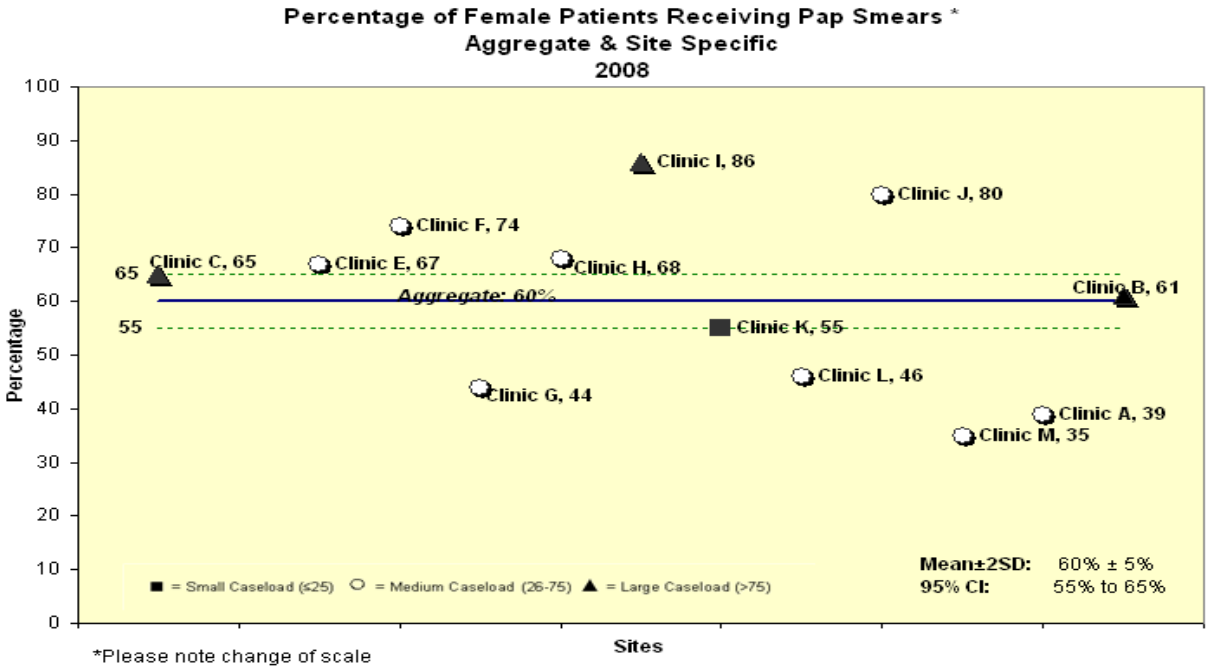
Table 13. Percentage of Female Patients Receiving Pap Smears, Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size (Female Patients)	n=439	n=417	n=403	n=370	n=371
Aggregate Sites Pap Smears	62%	69%	63%	67%	60%
By Site					
Clinic A	62%	23%	69%	56%	39%
Clinic B	74%	80%	85%	41%	61%
Clinic C	63%	65%	65%	56%	65%
Clinic D	-	-	-	-	-
Clinic E	75%	67%	70%	94%	67%
Clinic F	62%	70%	72%	69%	74%
Clinic G	55%	45%	67%	54%	44%
Clinic H	78%	68%	67%	78%	68%
Clinic I	70%	86%	79%	77%	86%
Clinic J	59%	95%	65%	70%	80%
Clinic K	67%	100%	56%	88%	55%
Clinic L	46%	63%	48%	63%	46%
Clinic M	72%	68%	21%	40%	35%

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



In 2007, the aggregate mean percentage of female patients who had received a Pap smear was 67% (95% CI: 62% to 72%). Based on a 95% confidence interval, Clinic E, Clinic H and Clinic I tended to have a higher proportion of female patients receiving Pap smears, while Clinic C, Clinic G, Clinic K, Clinic A, Clinic B and Clinic M had lower rates.



In 2008, the aggregate mean percentage of female patients who had ever received a Pap smear was 60% (95% CI: 55% to 65%). In 2008, five sites including Clinic I and Clinic L had higher rates of female patients receiving Pap smears compared to the group, and four other sites were low performers.

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 all 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) and by year of HIV diagnosis 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 (patients with any number of viral loads were included). Only patients with documentation of being on ART during the review year were included.

Table 14. Percentage of Patients on ART who Always and Never Had Viral Suppression, Aggregate

	2004	2005	2006	2007	2008
Always viral suppressed (VL always ≤ 400, On ART) **All Sites**	58%	59%	68%	64%	71%
Never viral suppressed (VL never ≤ 400, On ART) **All Sites**	14%	14%	12%	9%	7%

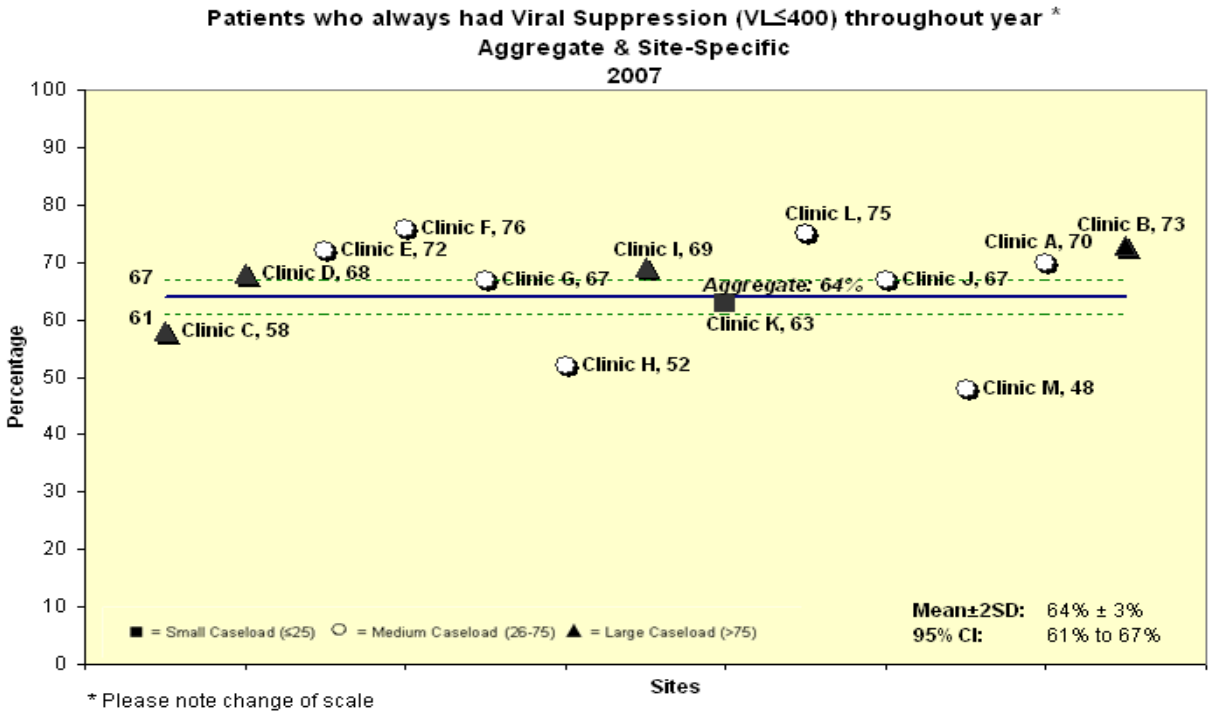
Overall, improvements in viral suppression were observed from 2004 to 2008, with an increase in the proportion of patients who always maintained an undetectable viral load for each full year, and a decrease in the percentage of patients with consistently detectable viral loads. Specifically, in 2008, 71% of patients maintained viral suppression throughout the year, compared to only 58% in 2004.

On the other hand, 14% of patients at all sites had viral loads that were always greater than 400 in 2004 and 2005. From this point onwards, however, there has been a steady decline in the proportion of patients with consistently detectable viral loads throughout a given year. In 2008, only 7% of all patients never achieved viral suppression.

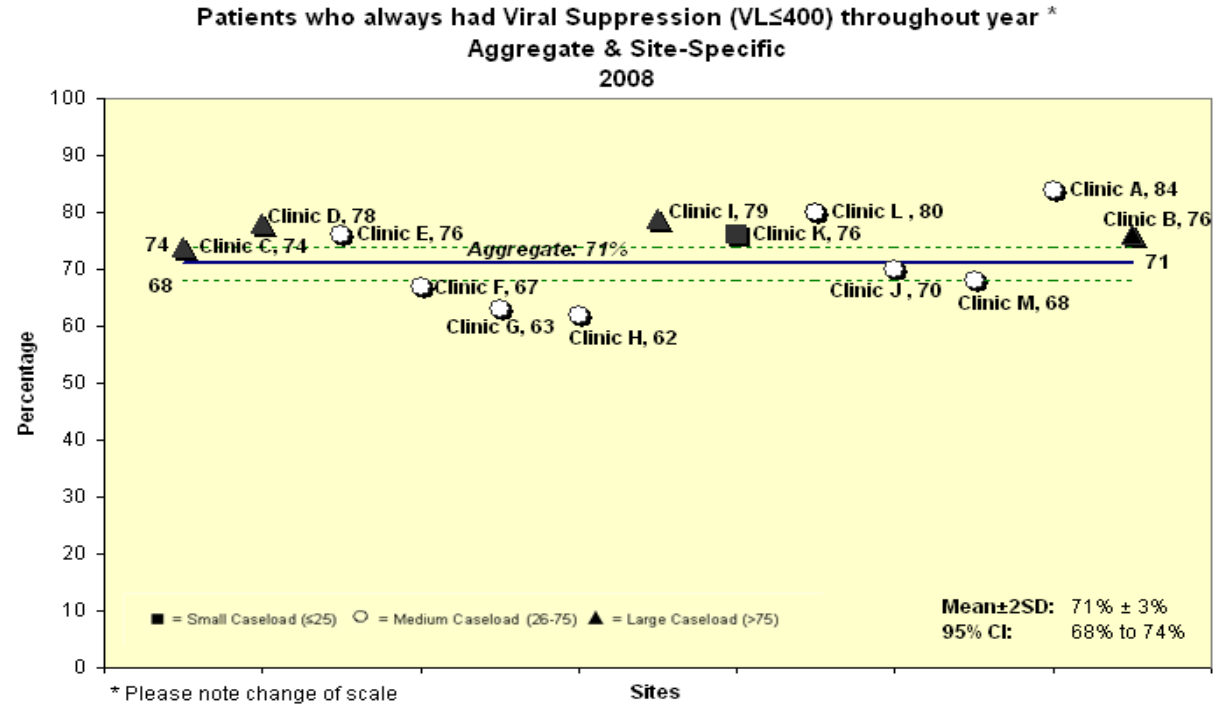
Table 15. Percentage of Patients on ART who always had Viral Suppression (VL≤400) throughout year, Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size (Patients on ART)	n=883	n=869	n=857	n=771	n=814
Aggregate Sites % of Patients with Always VL ≤ 400	58%	59%	68%	64%	71%
By Site					
Clinic A	59%	73%	82%	70%	84%
Clinic B	60%	63%	73%	73%	76%
Clinic C	61%	58%	71%	58%	74%
Clinic D	69%	75%	76%	68%	78%
Clinic E	74%	78%	71%	72%	76%
Clinic F	39%	53%	68%	76%	67%
Clinic G	48%	44%	69%	67%	63%
Clinic H	52%	57%	65%	52%	62%
Clinic I	61%	62%	67%	69%	79%
Clinic J	77%	74%	65%	67%	70%
Clinic K	47%	61%	71%	63%	76%
Clinic L	29%	18%	74%	75%	80%
Clinic M	56%	60%	63%	48%	68%

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 annually by site. Entry of newly diagnosed patients into a site's sample will lower the suppression rates for that year, which may account for the variability from year to year. Of course, some site to site comparisons should be interpreted with caution due to small sample sizes.



Among patients on ART, 64% (95% CI: 61% to 67%) in 2007 and 71% (95% CI: 68% to 74%) in 2008 had viral load suppression throughout the year. Based on a 95% confidence interval, in 2007, Clinic F, Clinic K, Clinic B and Clinic A tended to have more patients with viral load suppression compared to all sites, while Clinic H and Clinic M tended to have a lower proportion of patients with viral load suppression. In 2008, Clinic F, Clinic G, and Clinic H had lower proportions of patients with undetectable viral loads compared to all other sites.



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 (at last visit) each year for patients who were on ART. 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 16. Percentage of Patients with last VL ≤400 (on ART at last visit), Aggregate & by Subgroups

	2004	2005	2006	2007	2008
Total Sample Size	n=831	n=829	n=837	n=771	n=814
Aggregate Sites					
% of Patients with Last VL ≤ 400	77%	78%	83%	85%	87%
By Gender					
Male	79%	78%	87%	86%	91%
Female	77%	793%	81%	89%	89%
By Place of Birth					
U.S. Born	77%	78%	84%	86%	90%
Non-US Born	81%	81%	87%	89%	91%
By Race/Ethnicity					
Minority	76%	78%	84%	86%	89%
White non-Hispanic	81%	80%	86%	88%	92%
Hispanic	73%	77%	84%	85%	88%
Black non-Hispanic	78%	77%	85%	86%	89%
Asian/PI	87%	88%	94%	100%	92%
Other	83%	83%	50%	86%	75%
By Year of Diagnosis*					
Diagnosed in Year	-	**60%** (p=0.003)	**57%** (p=0.003)	**70%** (p=<.0001)	**70%** (p=0.0001)
Diagnosed Previously	-	**65%**	**75%**	**90%**	**91%**

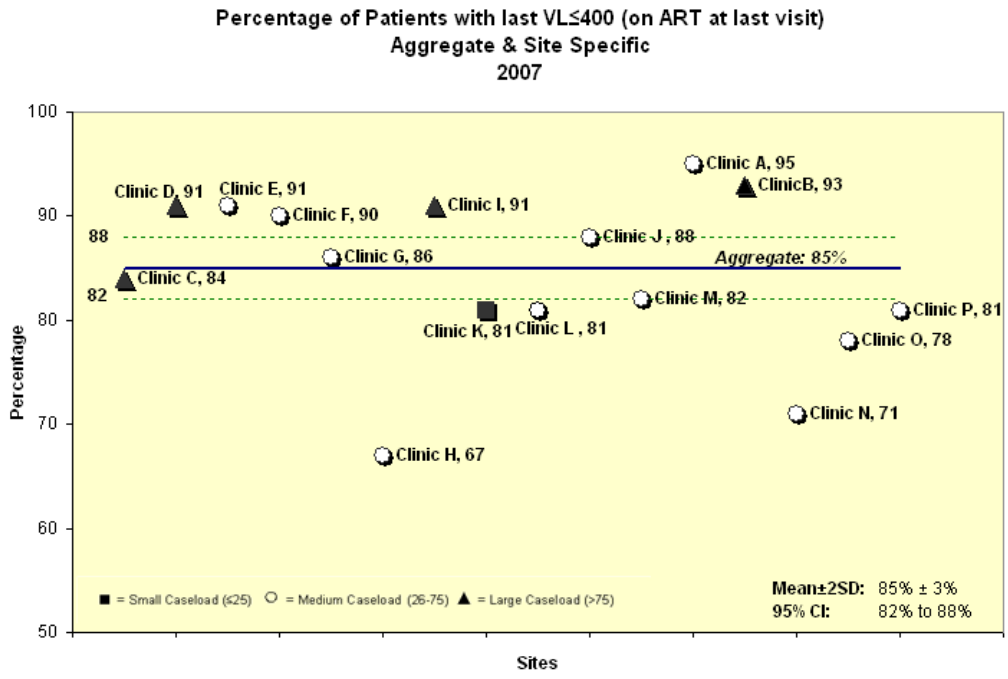
*Due to the small number of newly diagnosed patients reviewed in 2004, no relevant data are presented for this year. Patients newly diagnosed in a given year are compared to patients diagnosed in all years prior to that year.

From 2004 to 2008 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 2008 compared to 77% in 2004. In examining rates by demographic subgroups, there were no patterns to indicate any differences in last viral load. However, patients newly diagnosed with HIV in any given year were less likely to have achieved viral suppression than patients diagnosed in previous years. This is to be expected since treatment has only recently been initiated for those patients.

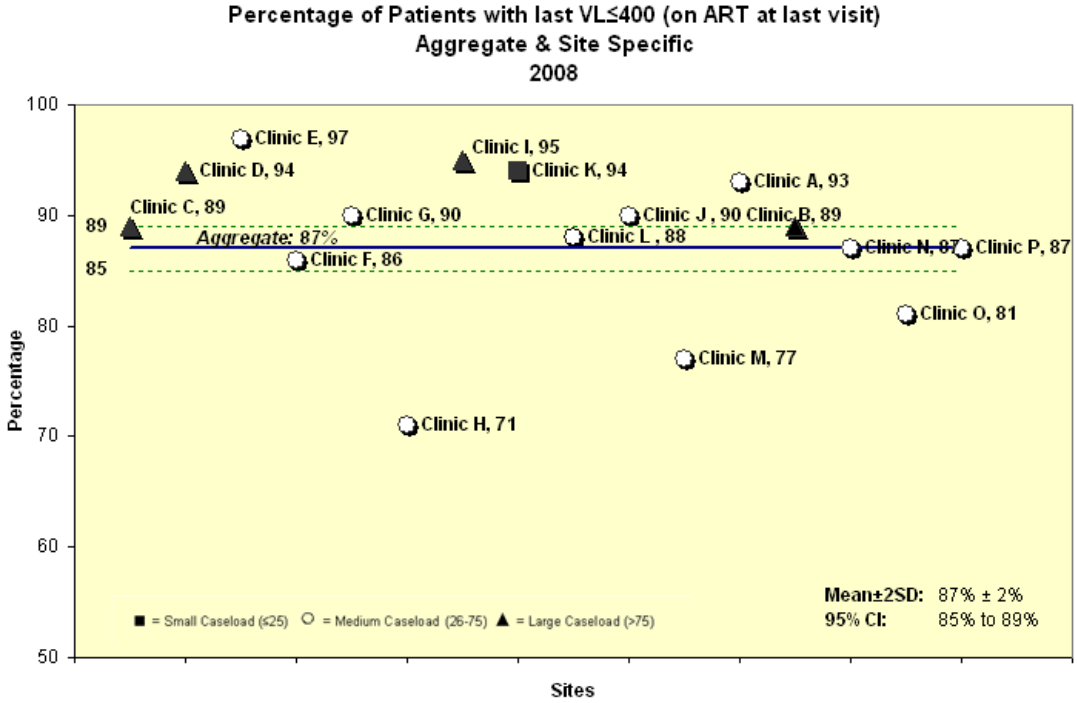
Table 17. Percentage of Patients with last VL ≤400 (on ART at last visit), Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size	n=831	n=829	n=837	n=751	n=798
Aggregate Sites					
% of Patients with VL ≤ 400	77%	78%	83%	85%	87%
By Site					
Clinic A	82%	94%	94%	95%	93%
Clinic B	84%	86%	89%	93%	89%
Clinic C	75%	78%	85%	84%	89%
Clinic D	88%	85%	90%	91%	94%
Clinic E	86%	87%	86%	91%	97%
Clinic F	56%	75%	88%	76%	74%
Clinic G	82%	71%	94%	86%	90%
Clinic H	57%	65%	68%	67%	71%
Clinic I	82%	87%	87%	91%	95%
Clinic J	92%	93%	86%	88%	90%
Clinic K	68%	94%	82%	81%	94%
Clinic L	60%	26%	78%	81%	88%
Clinic M	79%	67%	72%	82%	77%

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.



In 2007, the aggregate mean percentage of patients who were on ART and had undetectable last viral load at last visit was 85% (95% CI: 82% to 88%). Based on a 95% confidence interval, in 2007, Clinic A was the sole high performer; Clinic D, Clinic G, and Clinic H had the lowest rates of undetectable last viral load.



In 2008, the aggregate mean percentage of patients who were on ART and had undetectable last viral loads was 87% (95% CI: 85% to 89%). Based on a 95% confidence interval, in 2008, nearly all of the sites were above the mean percentage.

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 annually was selected for use as an outcome indicator.

Table 18. Percentage of Patients with last CD4>200, Aggregate & by Subgroups

	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites					
% of Patients with Last CD4 >200	83%	85%	85%	85%	86%
By Gender					
Male	85%	**85%** (p=0.01)	**87%** (p=0.04)	88%	88%
Female	87%	**89%**	**89%**	88%	86%
By Place of Birth					
U.S. Born	84%	86%	**86% (p=0.009)**	86%	**85% (p=0.03)**
Non-US Born	88%	87%	**92%**	90%	**91%**
By Race/Ethnicity					
Minority	**83% (p=0.008)**	**84% (p=0.03)**	86%	87%	88%
White non-Hispanic	**88%**	**89%**	89%	88%	87%
Hispanic	**79% (p=0.01)**	83%	83%	86%	84%
Black non-Hispanic	**86%**	86%	88%	88%	91%
Asian/PI	**84%**	90%	84%	93%	93%
Other	**83%**	81%	93%	82%	93%
By Year of Diagnosis					
Diagnosed in Year	-	**70%** (p=0.001)	**72%** (p=0.001)	**74%** (p=<.0001)	**65%** (p=<.0001)
Diagnosed Previously	-	**88%**	**88%**	**90%**	**89%**

*Due to the small number of newly diagnosed patients reviewed in 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 83% to 86% throughout the period, with a stabilizing trend noted.

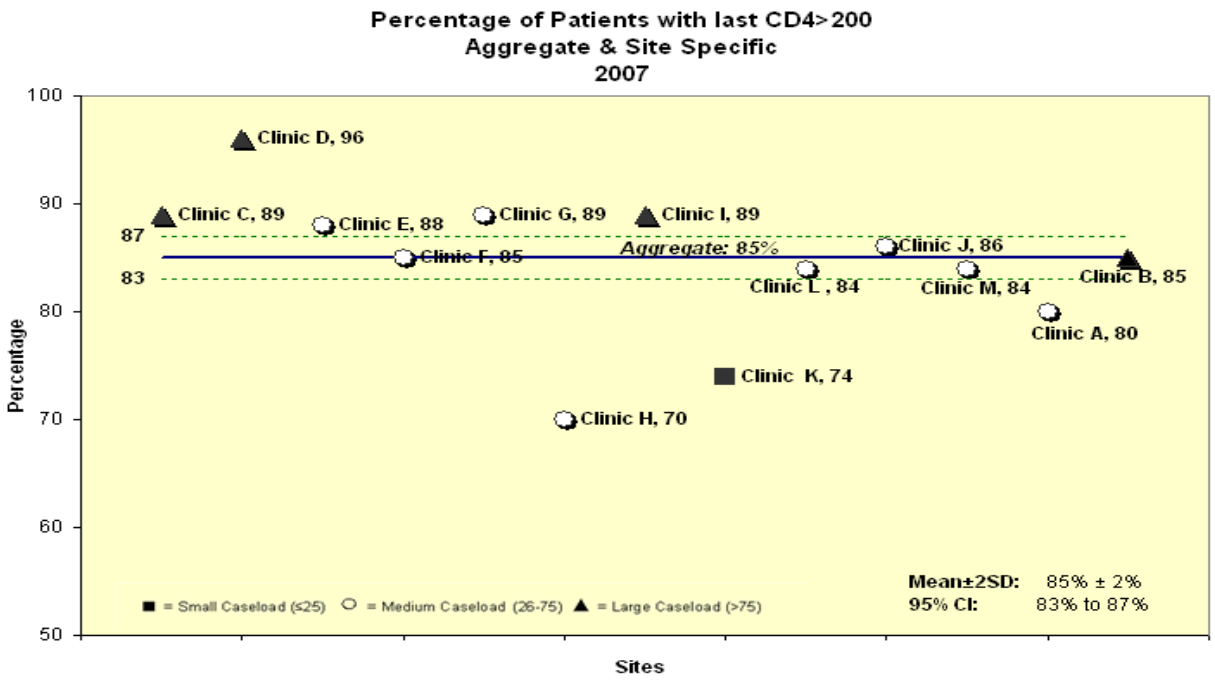
In 2005 and 2006, females were significantly more likely to have last CD4>200 than males. Although a greater proportion of non-US born patients tended to have last CD4>200 than U.S. born patients, this difference was only statistically significant in 2006 and 2008. In 2004 and 2005, racial/ethnic minorities were significantly less likely to achieve a last CD4>200 compared to White non-Hispanic patients. Among minorities, Hispanic patients were less likely to have

CD4>200 than others in 2004. As with viral suppression, patients newly diagnosed within the year were less likely to have a last CD4 >200 compared to patients diagnosed in previous years.

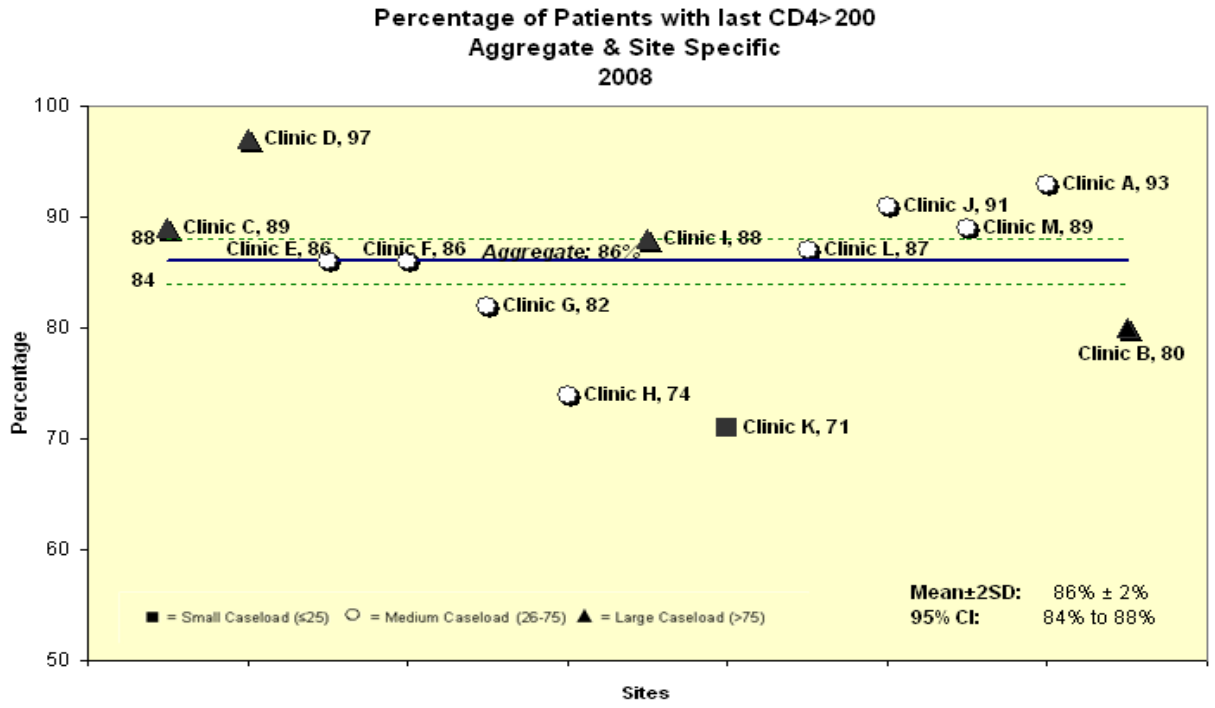
Table 19. Percentage of Patients with last CD4>200, Aggregate & Site-Specific

	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites % of Patients with Last CD4 >200	83%	85%	85%	85%	86%
By Site					
Clinic A	70%	78%	72%	80%	93%
Clinic B	84%	83%	87%	85%	80%
Clinic C	87%	84%	85%	89%	89%
Clinic D	95%	93%	92%	96%	97%
Clinic E	83%	81%	86%	88%	86%
Clinic F	69%	82%	81%	85%	86%
Clinic G	89%	86%	91%	89%	82%
Clinic H	76%	76%	87%	70%	74%
Clinic I	89%	84%	90%	89%	88%
Clinic J	94%	94%	93%	86%	91%
Clinic K	71%	76%	70%	74%	71%
Clinic L	81%	81%	84%	84%	87%
Clinic M	90%	87%	92%	84%	89%

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.



The aggregate mean percentage of patients who achieved a last CD4>200 at the end of 2007 was 85% (95% CI: 83% to 87%) and 86% (95% CI: 84% to 88%) at the end of 2008. Based on a 95% confidence interval, Clinic D patients had the highest likelihood of having achieved a last CD4>200 at the end of both years than patients at all sites; many other sites were also high performers. Clinic H and Clinic J patients at the end of both years were less likely to achieve a last CD4>200.



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 hospitalization rates in some sites.

Table 20. Percentage of Patients with documented Hospitalizations, Aggregate & By Subgroups

	2004	2005	2006	2007	2008
Total Sample Size	n=1107	n=1100	n=1038	n=960	n=967
Aggregate Sites					
% Ever Hospitalized in Year	16%	13%	13%	15%	13%
By Gender					
Male	13%	**10%** (p=0.04)	**11%** (p=0.05)	12%	12%
Female	19%	**15%**	**16%**	14%	14%
By Place of Birth					
U.S. Born	**18%** (p=0.002)	**14%** (p=0.003)	14%	**15%** (p=0.003)	**16%** (p=0.003)
Non-US Born	**10%**	**7%**	10%	**9%**	**8%**
By Race/Ethnicity					
Minority	17%	15%	14%	13%	14%
White non-Hispanic	14%	8%	11%	12%	11%
Hispanic	18%	17%	11%	15%	15%
Black non-Hispanic	17%	15%	17%	13%	14%
Asian/PI	6%	57%	11%	11%	11%
Other	21%	6%	7%	8%	13%
By HIV Stage					
AIDS	**19%** (p=0.0001)	13%	**15%** (p=0.004)	**15%** (p=0.003)	**15%** (p=0.02)
HIV	**10%**	11%	**9%**	**9%**	**10%**

Overall hospitalization rates remained the same across all sites during the period, between 13% and 16%. Women had higher rates than men in 2005 and 2006. In four of five years, US born patients were significantly more likely to have at least one documented hospitalization than non-US born patients. About 10% of non-US born patients had any documented hospitalization each year, compared to 15% of US born patients. No consistent differences were observed by race/ethnicity. However, patients with an AIDS-defining condition were 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 respectively had at least one hospital admission.

Estimates from this study are higher than the aggregate rate at Massachusetts 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 2004 to 2008, 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 target levels. An impressive improvement was also observed in patient health outcomes, specifically viral suppression, likely reflecting simplification of treatment regimens, 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 five recent review years to suggest any substantial disparity in care. While some differences were detected in certain years, most were eliminated by 2008. As appropriate, these findings may be used to inform the development of quality improvement projects targeted towards specific patient groups that may benefit from additional support or novel interventions.

In graphic form, 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. Variations in performance by sites were observed for certain indicators, including hepatitis A and B 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 2004 and 2008 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, Ryan White Parts A and B and Massachusetts state funded sites will continue to deliver quality care, reduce disparities, and support optimal health and quality of life for persons living with HIV/AIDS in the Boston EMA and across Massachusetts.

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APPENDIX A

Sites Reviewed for 2007-08 Data

Boston Medical Center
Fenway Community Health Center
Great Brook Valley Health Center
Greater Lawrence Family Health Center
Lowell Community Health Center
Lynn Community Health Center
Martha Eliot Health Center
Metrowest Medical Center
Somerville Primary Care, Cambridge Health Alliance
SSTAR Fall River
UMASS Memorial Health Care (UMMHC)-Memorial Campus
UMASS Memorial Health Care-University Campus HIV Clinic
Whittier Street Health Center
Zinberg HIV Clinic (Cambridge Health Alliance)

Sites Reviewed Previously

Baystate Brightwood Health Center
Baystate High Street Health Center
Baystate Mason Square Neighborhood Health Center
Greater New Bedford Community Health Center
Hyannis IDCS
Outer Cape Health Services Health Services
Taunton Infectious Diseases Associates

APPENDIX B

Aggregate & Site-Specific Samples by Caseload Size from 2004 to 2008

	2004	2005	2006	2007	2008
Aggregate Sample Size	812	797	762	960	967
Site-Specific Sample Size					
Clinic A					*M*
Clinic B					*L*
Clinic C					*L*
Clinic D					*L*
Clinic E					*M*
Clinic F					*M*
Clinic G					*M*
Clinic H					*M*
Clinic I					*L*
Clinic J					*M*
Clinic K					*S*
Clinic L					*M*
Clinic M					*M*

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