

**HIV/AIDS CLINICAL CARE QUALITY ASSURANCE PROJECT**

**Demographics and Clinical Care & Outcomes in 2006  
Among Recently Diagnosed HIV Positive Patients  
In BPHC Sites Funded Through Ryan White Part A Program**



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## I. EXECUTIVE SUMMARY

Clinical care processes and outcomes in 2006 were compared between recently diagnosed ('RD') (during 2002-2006) and continuing care ('CC') patients (diagnosed prior to 2002) reviewed via medical chart abstraction as part of an HIV quality assurance project funded by the Boston Public Health Commission (BPHC). Across 9 clinical sites combined, we observed several demographic trends, including a decrease in patients with IDU risk, an increase in foreign born, Black non-Hispanics, and patients with MSM risk in recent years.

Although nearly half of the RD patients recognized their HIV risk prior to testing, still a substantial percentage were unaware or had clinical symptoms or opportunistic infections at diagnosis, thus suggesting the need for targeted outreach to encourage earlier testing and linkage to care among higher risk groups. About 78% of patients had received partner counseling & referral services and 90% of partner contact occurred among those with a notification plan documented. Risk reduction counseling was also very high at 87%, with the majority of patients receiving counseling on safer sex.

Performance on most clinical care indicators was high overall, but some differences were found between the RD and CC groups. RD patients were more likely to have regular CD4 counts and to be on PCP prophylaxis when clinically indicated, but less likely to be on HAART when eligible relative to CC patients. Despite these differences, performance on these indicators approximately met or exceeded national targets. Rates of one time clinical interventions such as pneumococcal and hepatitis vaccinations however were lower in the RD group, implying that more time in care is needed after initial diagnosis in order to complete administration of these recommended services.

A few areas for improvement include Pap smears, STD screenings, and PPD screenings. In 2006, about 70% of all females received a Pap smear, compared to the Institute for Healthcare Improvement (IHI) goal of 90%. Among RD patients, gonorrhea and chlamydia screenings were disproportionately lower for males (~25%) than females (~60%). While no gender disparity was found, the syphilis screening rate of 69% was much lower than the IHI goal of 90%. About 35% of RD patients had a PPD screen in 2006, while 69% were screened at least once since diagnosis. Given the increasing number of foreign born patients and the higher TB positivity rate among this group, better PPD screening protocols are warranted.

As for clinical outcomes, 70% of all patients on HAART at anytime in the year maintained viral suppression in 2006 and 87% of all patients had last CD4 >200, with no differences between RD and CC groups. Rates of all-cause hospitalizations were also similar.

Overall, BPHC sites provide a high level of clinical care that meet most national targets and benchmarks. Thus, current quality improvement practices should be upheld so these achievements are sustained, while additional interventions should be implemented to address those areas where there is room for improvement or where disparities remain. In recognizing trends in patient demographics, differences in care processes, and emerging patient needs, providers are better poised to respond with more decisive and targeted services to ensure equitable and quality care for all persons living with HIV.

## **II. INTRODUCTION**

### **2.1 Background**

Ongoing assessments of HIV clinical processes and recognizing areas for improvement are important priorities for ensuring quality care in publicly-funded programs nationwide. Despite prevention efforts to reduce HIV transmission, there continues to be new HIV infections and new patients who require access to medical attention and other social services. Since 2002, JSI has conducted biannual reviews of HIV/AIDS primary outpatient care provided in 10 Boston EMA Part A sites as part of a quality assurance project funded by the Boston Public Health Commission (BPHC) to evaluate clinical performance and to identify opportunities for improving care and health outcomes for people living with HIV/AIDS. This report describes a subset of patients newly diagnosed with HIV and newly entering care between 2002 and 2006 and focuses on clinical processes and outcomes in 2006, since this is the most recent year for which data are available. Comparisons are made to patients who were diagnosed prior to 2002 and overall performance relative to national benchmarks or guidelines are presented.

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 (MDPH) 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). Three cycles of review have been completed and seven years of data are available (2000 to 2006). 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. It should be noted that although review data were also collected from other sites funded by MDPH, this report is limited to sites receiving BPHC funds.

### **2.2 Data Collection Protocol**

Medical chart abstractions were conducted by JSI research nurses and clinical research assistants who received detailed training on the quality assurance project and on standards and processes of HIV outpatient care. JSI staff signed confidentiality agreements assuring complete adherence to patient privacy protection. Nurses and research staff utilized medical records, including process notes, flowsheets, laboratory reports, and other documentation found in patient records to complete elements on the data collection instrument. Other secondary data sources were also sometimes used to fill in gaps or confirm chart information as appropriate. 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.

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.

### **2.3 Benchmarks for Quality HIV Care**

Nationally recognized guidelines and recommendations for quality HIV care are available and are referenced throughout this report as benchmarks for standards of care. Sources for these guidelines included the United States Public Health Service (USPHS), Institute for Healthcare Improvement (IHI), the Centers for Disease Control and Prevention (CDC), Infectious Diseases Society of America (IDSA), and the Health Resources and Services Administration HIV/AIDS Bureau (HRSA/HAB).

Guidelines used included recommendations on preventing infections such as pneumocystis pneumonia (opportunistic infection) and vaccine-preventable diseases such as pneumococcal disease and viral hepatitis A and B, among patients at risk based on CD4 cell count and screening.<sup>1</sup> Pneumococcal vaccines and viral hepatitis screenings and vaccinations among those susceptible are universally administered and thus were assessed as ever having been provided since diagnosis. On the other hand, many other clinical services fall into the category of routine or annual interventions provided every year. These include provider visits, monitoring of CD4 and viral loads, use of HAART, Pap smears, PCP prophylaxis, and annual influenza vaccine among others. HRSA HAB has established performance criteria based on clinical studies and expert opinion for evaluating some of these indicators (visits, CD4 monitoring, PCP prophylaxis, HAART prescription), all of which are defined in its Group 1 Core Clinical Performance Measures guide.<sup>2</sup> IHI goals for certain measures were also used as benchmarks.<sup>3</sup> Guidelines and criteria for other clinical measures such as TB screening, Pap smears, risk reduction counseling, STD screenings, hepatitis screening and vaccinations for example are also presented in HRSA HAB's initial proposed draft 2<sup>nd</sup> and 3<sup>rd</sup> Tier Clinical Performance Measures guide.<sup>4</sup> Since guidelines changed throughout the years, those that were in effect during the review year were used as the criteria for evaluating clinical care. For this report, those criteria in effect in 2006 were used.

### III. POPULATION

#### 3.1 Participating Sites

Clinical chart reviews and medical record data abstractions were conducted to collect clinical process and outcome data during 1999-2006 from clinical sites providing HIV care funded by the Boston Public Health Commission through Part A of the Ryan White HIV/AIDS Treatment Modernization Act. These sites included:

- Boston Medical Center (Infectious Disease Clinic, Project Trust, Primary Care Clinic)
- 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
- Whittier Street Health Center
- Zinberg HIV Clinic (Cambridge Health Alliance)

#### 3.2 Patient Sample

A total of 670 patients, alive throughout 2006, were reviewed. Of these, 45% (301) were diagnosed with HIV during 2002 to 2006 and entered care within one year of diagnosis, while 55% (369) were diagnosed prior to 2002 (Table 1). Recently diagnosed patients are defined as those patients who were newly diagnosed and new to HIV care between 2002 and 2006. The continuing cohort represents all patients reviewed who were diagnosed prior to 2002. Of the 84% (565/670) of patients with 2 or more medical visits with a clinical provider in 2006, 44% were recently diagnosed patients and 56% continuing care patients.

Table 1. Distribution of Newly Diagnosed HIV+ Patients by Year & Total Sample Sizes by Cohort				
Year of Diagnosis	Alive in 2006	Alive & ≥2 visits in 2006	Alive & ≥2 visits in 2006 & Diagnosed on or before 6/30/06	
2002	60	49	49 <sup>a</sup>	
2003	88	71	71	
2004 <sup>b</sup>	6	6	6	
2005	59	54	54	
2006	88	69	44	
<b>Recently Diagnosed Cohort</b>	<b>301</b>	<b>249</b>	<b>224</b>	
<b>Continuing Care Cohort</b>	<b>369</b>	<b>316</b>	<b>316</b>	
<b>Total Sample</b>	<b>670</b>	<b>565</b>	<b>540</b>	

<sup>a</sup> For some process indicators, 2006 data were collected for only patients diagnosed in 2003 and after; therefore, the sample size for these measures will not include the 49 patients diagnosed in 2002 (224-49 = 175).

<sup>b</sup> During the 2003-2004 review cycle, the decision was made to review mostly newly diagnosed patients in 2003 as this would provide at least one additional full year of review in 2004. Therefore, the number of patients reviewed who were newly diagnosed in 2004 was small.

#### IV. METHODS

The objectives of this analysis were to characterize patients who are recently diagnosed HIV positive and receiving HIV care for the first time in 9 BPHC clinics and to identify any differences in demographics, care processes, and outcomes between recently diagnosed and continuing care patients in 2006. Specifically, this report aims to answer the following research questions:

- 1) What are the demographics of patients recently diagnosed with HIV? Are there any differences between recently diagnosed patients (2002 to 2006) and those diagnosed prior to 2002?
- 2) What factors were associated with HIV testing and diagnosis (For example: known exposure, AIDS-defining OI, self-monitoring, routine testing) among recently diagnosed patients?
- 3) What percentage of recently diagnosed patients had documented receipt of partner counseling and referral services?
- 4) What percentage of patients received the recommended HIV clinical care services in 2006? Were there any disparities in these care processes by demographic subgroups and recently diagnosed or continuing care status?
- 5) Are there any differences in clinical outcome measures (viral suppression, CD4 count, hospitalizations) between patients in the recently diagnosed and continuing care cohorts?

All patients alive throughout 2006 were included in the analyses on demographic trends. Differences in demographics between the two groups were analyzed using bivariate chi-square tests. To evaluate circumstances related to initial HIV testing and/or diagnosis and receipt of partner counseling and referral services, we used descriptive statistics, and focused on the recently diagnosed subgroup, as these data were not collected for patients in the continuing cohort in previous review cycles.

For care process and outcome measures, only patients alive with at least 2 visits in 2006 and diagnosed on or before 6/30/06 were included in the denominator (N=540: recently diagnosed n= 224 & continuing care n= 316); since having less than 2 visits or a more recent HIV diagnosis may not necessarily be sufficient time in care for clinical services to be delivered (Table 2). An exception was the measure on number of provider visits, where we also included patients with any number of visits. Also, for the 2006 data, the full clinical chart review was conducted on only patients new to care and newly diagnosed in 2003 and after. Therefore, the sample sizes for some process measures will exclude the 49 patients newly diagnosed in 2002 (n =175) and no comparisons between the recently diagnosed and continuing care cohorts were made. Clinical outcome indicators, however, were obtained for all patients and thus statistical comparisons between the two groups were feasible and are presented. Where appropriate, differences by gender, place of birth, and race-ethnicity across the two groups were also evaluated.

\* '(RD)' *is used in relevant section to denote that 2006 data were collected for the recently diagnosed group only. Sections without this notation indicate data were collected for all patients.*

**Table 2. Percentage of Patients Alive in 2006, with  $\geq 2$  Visits, and Diagnosed on or before 6/30/2006**

	Recently Diagnosed N=224	Continuing Cohort N=316	Total N=540
Alive & $\geq 2$ visits in 2006 & Diagnosed on or before 6/30/06	41% (224/540)	59% (316/540)	100% (540)
Alive in 2006	45% (301/670)	55% (369/670)	100% (670)

Data Elements Collected in 2006 for Recently Diagnosed and Continuing Care Cohorts

	Data Available for ONLY Recently Diagnosed Group (2003-2006) N= 175*	Data Available for Entire Sample BOTH Recently Diagnosed & Continuing Cohort N=540
<b>Process indicators</b>	<ul style="list-style-type: none"> <li>• Patient Counseling &amp; Referral Services</li> <li>• TB Screening</li> <li>• STD screenings</li> <li>• Cholesterol/Glucose Screening</li> <li>• Risk reduction counseling</li> <li>• Influenza Vaccine</li> <li>• HAART Adherence Assessment &amp; Counseling</li> <li>• Substance Abuse</li> <li>• Mental Illness</li> <li>• Mammography (females)</li> </ul>	<ul style="list-style-type: none"> <li>• Visits</li> <li>• CD4 counts</li> <li>• PCP Prophylaxis</li> <li>• On HAART</li> <li>• Pap smears (females)</li> <li>• Hepatitis A, B, C Screening, Immunization, Treatment</li> <li>• Pneumovax</li> <li>• Pregnancy (females)</li> </ul>
<b>Outcome indicators</b>	<ul style="list-style-type: none"> <li>• Incidence of New Infections</li> </ul>	<ul style="list-style-type: none"> <li>• Viral load suppression</li> <li>• CD4&gt;200</li> <li>• Hospitalizations</li> </ul>
<b>Comments</b>	<p>The full clinical chart review in 2006 was conducted only on patients newly diagnosed and new to care in 2003 and onwards. Therefore, data on the clinical measures listed above are <u>not</u> available for newly diagnosed and new to care patients in 2002. Thus, no comparisons between recently diagnosed and continuing care patients were made for measures listed above.</p>	<p>Comparisons between recently diagnosed (n=224) and continuing care patients (n=316) were feasible and are presented in this report for the measures listed above.</p> <p>The <i>visits</i> measure will include 635 patients as we did not exclude patients with less than 2 visits in year.</p>
<p><i>'(RD)'</i> is used in relevant sections to denote that 2006 data were collected for the recently diagnosed group only. Sections without this notation indicate data were collected for all patients.</p>		

## V. RECENTLY DIAGNOSED HIV POSITIVE PATIENTS

### 5.1 Demographics

To analyze changing demographic trends in the HIV patient population receiving care in the 9 clinics funded by the Boston Public Health Commission through the Ryan White Part A program, we divided the sample into two unique cohorts.

- 1) *Recently diagnosed cohort:* Patients newly diagnosed with HIV and newly entering care between 2002 and 2006 (n=301).
- 2) *Continuing care cohort:* Patients diagnosed prior to 2002 (n=369).

Since process and outcome measures collected in 2006 were used in the analysis, we included patients who were alive throughout 2006 in the total sample (N=670).

Patients receiving care across the 9 clinics represent very diverse populations, with the total sample including approximately 60% males, 70% minorities, and 59% foreign born. About 24% of patients had MSM HIV risk, another 23% with IDU transmission risk, and 65% with heterosexual transmission risk. The sample is roughly split between patients with AIDS diagnoses (54%) and HIV-positive non-AIDS patients (46%).

Several distinctions in demographics were noted between the recently diagnosed and continuing care cohorts (Table 3). More foreign born patients (56%), more Black non-Hispanics (43%), fewer Hispanics (20%), and fewer patients with IDU risk (10%) but more patients with MSM risk (31%) were represented in the recently diagnosed group than in the continuing care cohort. Specifically in the continuing care group, 28% were foreign born, 34% were Black non-Hispanic, 34% were Hispanic, 19% had IDU risk, and 34% had MSM transmission risk. Recently diagnosed patients were also younger, with a mean age of 40 years in 2006, compared to a mean age of 46 in the continuing cohort. As expected, a lower proportion of recently diagnosed patients have an AIDS diagnosis (44%).

Substance abuse and mental illness data were only collected for the recently diagnosed subgroup in 2006. About 30% had active mental illness in 2006, 8% had a prior history and 62% had no history of mental illness. Approximately 13% had active substance abuse, 12% were inactive, and 75% had no history of substance abuse. Although data were not collected in 2006 for continuing care patients, we examined history of ever having mental illness or ever having substance abuse to provide some context for comparison. Of continuing care patients, 58% had a history of substance abuse and 69% had a history of mental illness from previous reviews.

**Table 3. Percentage of All Patients Reviewed & Alive Throughout 2006, By Group**

	Recently Diagnosed N=301	Continuing Cohort N=369	Total N=670
Alive in 2006	45% (301/670)	55% (369/670)	670
<i>Alive &amp; ≥2 visits in 2006 &amp; Diagnosed on/before 6/30/06</i>	41% (224/540)	59% (316/540)	540
Demographics			
<b>Males</b>	62%	56%	59%
<b>Foreign born***</b>	56%	28%	41%
<b>Minority</b>	68%	72%	70%
<b>Race-ethnicity</b>			
White non-Hispanic	32%	28%	30%
Black non-Hispanic*	43%	34%	38%
Hispanic***	20%	34%	28%
Asian non-Hispanic	2%	3%	3%
<b>HIV Risk Factor</b>			
MSM**	31%	19%	24%
Heterosexual	67%	64%	65%
IDU Risk***	10%	34%	23%
<b>Initial CD4 Count</b>			
≤200	31%	26%	28%
>200	69%	74%	72%
<b>HIV stage***</b>			
HIV	55%	38%	46%
AIDS	44%	62%	54%
<b>Mean Age (Range)***</b>	40.0 (18-70)	46.4 (24-77)	43.5 (18-77)
<b>Substance Abuse in 2006</b>			
Active	13%		
Inactive (History only)	12%	-	-
No history	74%		
No documentation	1%		
<b>Mental Illness in 2006</b>			
Active	29%		
Inactive (History only)	8%		
No history	62%	-	-
No documentation	1%		
<b>Incarcerated in Year</b>	2.4%	2.5%	2.5% (16)

*Note: Substance abuse & mental illness were not assessed in 2006 for patients diagnosed in 2002 or earlier*

*\*p<.05, \*\*p≤.01, \*\*\*p≤.0001*

## 5.2 Reasons for HIV Testing <sup>(RD)</sup>

Early detection and linkage to care and treatment are associated with better prognosis and management of HIV disease. Further, understanding reasons for seeking testing and the circumstances under which HIV is diagnosed are important to inform the development of targeted outreach efforts to encourage HIV testing among higher risk groups.

Among patients newly diagnosed with HIV during 2003 to 2006, we collected information on factors associated with HIV testing and diagnosis. Patient awareness of HIV risk prior to testing was determined from intake forms and provider or case management notes. Approximately 46% (134/292) of patients were aware of their risk for HIV prior to testing. HIV transmission risk factors that patients recognized included MSM risk (60%), heterosexual transmission risk (35%), intravenous drug use risk (10%), and occupational or blood products exposures (2%). Patients may be exposed to multiple risk factors and thus cumulative percentage exceeded 100%.

Among recently diagnosed patients with data available on factors associated with HIV testing or diagnosis, 36% presented with clinical symptoms or illness (including opportunistic infections) that prompted HIV testing (Table 4). Another 35% of patients were aware of personal risk for HIV infection, either due to known exposure to HIV+ person (18%) or self-monitoring and acknowledgement of personal risk (17%). Thirteen percent of patients were diagnosed with HIV via routine screening (with low risk or expectation of being positive) and of these, nearly half were tested for immigration (13/24). Six percent had testing related to pregnancy, 5% were tested due to associated diagnoses (TB, HCV, STD), and about 3% of diagnoses occurred in high risk settings (prison, substance abuse treatment).

<b>Table 4. Factors Associated with HIV Testing and Diagnosis</b>	
<b>Factors associated with HIV testing and/or diagnosis</b>	<b>Percentage % Recently diagnosed N=191</b>
Clinical symptoms or illness (including OIs)	36% (68)
Associated diagnoses (TB, HCV, STD)	6% (11)
Known exposure to HIV+ person (current or remote)	18% (35)
Self-monitoring (acknowledges personal risk)	17% (32)
Routine screening (low risk, not expecting to be positive)	13% (24)
Related to pregnancy (prenatal screening or after child tested positive)	7% (13)
High risk setting (substance abuse treatment, prison)	4% (8)

A greater proportion of males had clinical symptoms or associated diagnoses (47%) than females (31%) at initial positive diagnosis. Also, 19% of males acknowledged personal risk for HIV, compared to 12% of females. Foreign born patients (17%) were more likely to be tested positive via routine screening with no expectation of being positive (during immigration) compared to US born patients (8%). Further, 28% of

(RD) = Data on Recently Diagnosed Patients Only

foreign born were aware of personal risk or had known exposure to HIV positive person compared to 43% of US born patients.

### 5.3 Partner Counseling & Referral Services <sup>(RD)</sup>

Upon a positive HIV diagnosis, clinicians need to provide the necessary medical treatment and referrals to case management services as appropriate to assist patients in managing the disease and coping with potential social and psychological effects associated with living with HIV. HIV education and risk reduction counseling are also provided to prevent further transmission of HIV.

Of the 301 recently diagnosed patients alive in 2006, we excluded 60 who were diagnosed in 2002, since data on partner counseling and referral services (PCRS) were only collected beginning with patients newly diagnosed in 2003.

Approximately 78% (168/215) of patients received PCRS at intake. Among those who received discussion on PCRS, 48% (81/168) had a partner notification plan initiated by the site, where the patient informs the partner and/or brings the partner in for testing). Rates of partner notification plans did not differ by gender, race-ethnicity, place of birth, or HIV risk (MSM, heterosexual, or IDU risk). The Department of Public Health was also notified to contact partners of two patients (1.1% or 2/168). Of patients with a partner notification plan in place, 90% had documentation of partner contact occurrence. Of 57 patients with no action for partner notification, we determined that the main reasons were partner was known HIV-positive (35%) and patient has had no recent sexual contacts (44%) (Table 5).

<b>Table 5. Reasons for no PCRS Action among Recently Diagnosed Patients</b>	
<b>Reasons for no PCRS action</b>	<b>Recently Diagnosed (N=57)</b>
Partner known HIV-positive	35% (20)
Patient with no recent contacts	44% (25)
Patient unable to identify contacts	4% (2)
Patient refused	7% (4)
Other/Unknown	11% (6)

(RD) = Data on Recently Diagnosed Patients Only

#### 5.4 Positive Prevention - Risk Reduction Counseling <sup>(RD)</sup>

Although no current national benchmarks or targets yet exist for this indicator, USPHS guidelines state that risk reduction counseling should "...be done at the initial visit and subsequent routine visits or periodically, as the clinician feels necessary, but at a minimum of yearly." Risk reduction counseling includes but is not limited to assessment of risky behaviors, communication of prevention messages, such as safer sex or drug use behaviors, and any other discussions, counseling, or referrals that aim to reduce transmission of HIV or STDs.<sup>5</sup>

On examination, rates of risk reduction at entry to care among the recently diagnosed group (n=301) were high: 88% had documentation of any risk reduction counseling at initial diagnosis or intake, 81% were counseled on safer sex, and 42% had discussion on drug use.

Of recently diagnosed patients, 87% (153) had received any risk reduction counseling in 2006 (Table 6). Males (91%) were significantly more likely to be counseled than females (87%) (p=0.01). No other differences were observed by place of birth or race-ethnicity.

**Table 6. Rates of Risk Reduction Counseling in 2006 among Recently Diagnosed Patients**

	<b>Recently Diagnosed (N=175*)</b>
Any Risk Reduction Counseling	87% (153)
Sexual	87% (152)
Drug	40% (70)

*\*Rates for continuing cohort or patients diagnosed in 2002 unavailable as these data were not collected in 2006, thus only 175 patients were included for this indicator.*

Similar rates of any risk reduction counseling (sexual or drug) were observed among patients with MSM, heterosexual, or IDU transmission risk. However, as expected, patients with documented IDU risk (71% or 12/17) were much more likely to receive any counseling on drugs specifically than patients without IDU risk (37% or 58/158), with p <0.01.

(RD) = Data on Recently Diagnosed Patients Only

## VI. CLINICAL PROCESS INDICATORS

### A. ANNUAL CLINICAL INTERVENTIONS

#### 6.1 Medical Visits with an HIV Provider

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 to 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 chart review, 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 the last review cycle, for the purpose of measuring 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.

Of 635 patients diagnosed on or before 6/30/06 and alive throughout 2006, 7% (46) had no visits with a medical provider, 13% (83) had one visit, 26% (163) had two visits, and 54% (343) had three or more visits with an HIV prescribing provider. Of those with less than 2 visits in 2006, 10 had incarceration in year and 9 were documented as being lost to follow up (moved, transferred care, lost).

Approximately eighty percent (506/635) of patients had visits in two or more trimesters, with no difference in rates of visits between continuing care (80%) and recently diagnosed patients (79%) (Table 7). In the recently diagnosed group, no differences were observed by place of birth or race-ethnicity, but females (84%) tended to have more regular visits than males (75%), though this was not statistically significant. No significant differences were observed in the continuing cohort either, though females (84%) and foreign born patients (85%) tended to have regular visits than males (78%) and US born patients (79%) respectively.

**Table 7. Medical Visit in 2 or More Trimesters in 2006 among Recently Diagnosed & Continuing Care Patients**

	<b>Recently Diagnosed Patients N=266</b>	<b>Continuing Cohort N=369</b>	<b>Total Sample N=635*</b>
Medical Visit in 2 or More Trimesters	79% (209)	80% (297)	80% (506)

*\*Includes all patients alive and diagnosed on or before 6/30/06. For all other measures presented hereafter, the denominator will exclude patients with less than 2 visits, as having such few visits may not be sufficient time for clinicians to provide the necessary medical services.*

## 6.2 Monitoring of Immune Function (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 HAART initiation, modification, or PCP prophylaxis. CD4 counts are also associated with disease prognosis and survival outcomes. Current USPHS 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 ( $\geq 90$  days). Thus, performance evaluation was based on this criterion.

Eighty-six percent (462/540) of all patients diagnosed on or before 6/30/06 and alive with 2 or more visits in 2006 had at least 2 CD4 counts measured in year that were 3 months apart (Table 8). Another 5% of patients had at least 2 CD4 counts that were not 3 months apart. Fifty-two patients or 10% had fewer than 2 CD4 counts in year. Recently diagnosed patients (90%) were more likely to have regular CD4 counts than continuing care patients (83%) ( $p=0.05$ ). Furthermore, 12% of continuing care patients had fewer than 2 CD4 counts in 2006, compared to 6% of recently diagnosed patients.

No differences in rates of CD4 counts were observed among the recently diagnosed group by gender, place of birth, or ethnicity. However, in the continuing care cohort, males (87%) tended to have more regular CD4 counts than females (77%), though this did not reach statistical significance ( $p=0.10$ ). Also, 18% of females had fewer than 2 CD4 counts measured in 2006, compared to about 8% of males. Foreign born patients (91%) were significantly more likely to have regular CD4 counts than US born patients (80%) ( $p=0.05$ ). On the other hand, minorities were much less likely to have consistent CD4 monitoring than White non-Hispanics ( $p=.007$ ). About 93% of White non-Hispanics had 2 or more CD4 counts that were at least 3 months apart in year, compared to only 75% of Hispanics and 80% of Black non-Hispanics.

**Table 8. Percentage of Patients with Regular CD4 Counts Measured in 2006 Among Recently Diagnosed & Continuing Care Patients**

	Recently Diagnosed Patients N=224	Continuing Cohort N=316	Total Sample N=540
$\geq 2$ CD4 Counts at least 3 months apart*	90% (201)	83% (201)	86% (462)

\* $p=0.05$

### 6.3 PCP Prophylaxis

*Pneumocystis jiroveci* pneumonia (PCP) is an opportunistic infection that is preventable with the appropriate use of PCP prophylaxis when indicated. USPHS guidelines state that all patients should receive PCP prophylaxis when CD4 count < 200 cells/mm<sup>3</sup> for greater than 3 months. PCP prophylaxis is also included as one of the core HRSA/HAB HIV clinical performance measures, and the IHI goal is that at least 95% of all eligible patients be prescribed PCP prophylaxis.

About 25% of all patients in our sample met the clinical eligibility criteria for PCP prophylaxis in 2006 (Table 9), with no differences in eligibility rates between continuing care (24%) and recently diagnosed (27%) patients. Ninety-four percent of eligible patients were on PCP treatment in 2006 (100% of eligible recently diagnosed and 89% of eligible continuing care patients (p<.01)), thus nearly meeting the IHI goal of 95%. Of the 8 continuing care patients who were eligible but not on treatment, three had single CD4<200, and thus required further monitoring. The remaining 5 patients not on PCP prophylaxis had no documentation of any discussion of treatment in their medical charts.

**Table 9. Percentage of Patients with Eligible for and on PCP Prophylaxis in 2006 Among Recently Diagnosed & Continuing Care Patients**

	Recently Diagnosed Patients N=224	Continuing Cohort N=316	Total Sample N=540
Eligible for PCP Prophylaxis	27% (61)	24% (76)	25% (137)
On Prophylaxis (among eligible)**	100% (61/61)	89% (68/76)	94% (129/137)

\*\*p<0.01

## 6.4 Antiretroviral Therapy

USPHS guidelines recommend antiretroviral therapy for all patients with a diagnosis of AIDS (CD4 count < 200 cells/mm<sup>3</sup> 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 periods, and the guidelines in place during the year of review were used to determine HAART eligibility. The IHI target for this performance measure is that at least 90% of all patients eligible for HAART be prescribed HAART.

Among 540 patients in the sample, 85% (457/540) met the clinical criteria in 2006 to be on HAART (Table 10). We found a statistically significant difference in the proportion of continuing care patients (90%) who were eligible for HAART than recently diagnosed patients (78%) (p=0.0002).

In 2006, 93% of patients eligible for HAART were on HAART, with no significant difference between recently diagnosed (91%) and continuing care (95%) patients. Treatment was discussed with 90% (27/30) of those eligible but not on HAART, and 52% (14/27) of these refused treatment. Although not statistically significant, recently diagnosed females (95%) tended to be on HAART when clinically indicated more frequently than males (89%). White non-Hispanics (84%) had significantly lower rates of being on HAART than minorities (95%) (p=0.02).

<b>Table 10. Percentage of Patients on HAART (among eligible) in 2006 Among Recently Diagnosed &amp; Continuing Care Cohort</b>			
	<b>Recently Diagnosed Patients N=224</b>	<b>Continuing Cohort N=316</b>	<b>Total Sample N=457</b>
HAART eligible***	78% (174)	90% (283)	85% (457)
On HAART (of clinically indicated)	91% (159/174)	95% (268/283)	93% (427/457)
***p<0.0001			

### 6.4.1 Adherence Assessment <sup>(RD)</sup>

Adherence to antiretroviral therapy is associated with virologic suppression, reduced viral resistance, and improved survival outcomes. The IHI goal is that at least 90% of patients on HAART receive adherence counseling. USPHS guidelines also recommend that “adherence counseling and assessment should be done at each clinical encounter”.<sup>6</sup>

Among recently diagnosed patients on HAART at anytime during 2006, we determined the rate of adherence assessment, adherence intervention/support, side effects, and HAART interruptions. Ninety-eight percent of patients had adherence assessment documented at least once, thus exceeding the IHI goal of 90%. Furthermore, 92% of all patients received adherence support or intervention, with 88% provided patient education, 15% instructed on a medication reminder system, and 10% provided with

(RD) = Data on Recently Diagnosed Patients Only

information on side effect management (Table 11). Several patients also obtained assistance on insurance issues for medication coverage.

**Table 11. Adherence Support/Interventions Among Recently Diagnosed Patients (2003 to 2006)**

	Recently Diagnosed, On HAART (N=123)
Patient Education	88% (108)
Medication Change	9% (11)
Reminder System	15% (18)
Side Effect Management	10% (12)
Directly Observed Therapy	2% (2)
Other	3% (4)

*Note: Cumulative percent greater than 100% as patients may have received more than one type of adherence support or intervention.*

Approximately 21% (25/123) of patients had some difficulty adhering to antiretroviral therapy. Problems were due to medication side effects, forgetting, insurance coverage issues, substance abuse relapse, or mental illness. Difficulties in swallowing, losing or running out of medications, confusion over regimen were other problems that were cited. Among patients with adherence problems identified, 92% (23/25) were provided support or interventions.

In all, 16% of recently diagnosed patients (20/123) had documentation of any side effects from HAART. The majority of patients (8/20) experienced gastrointestinal problems. Other side effects included anemia/leukopenia (3), hepatitis/liver disease (1), lipdystrophy (1), and hypercholesterolemia (1). Insomnia, fatigue, nightmares, dizziness or lightheadedness were also side effects noted.

#### 6.4.2 HAART Interruption <sup>(RD)</sup>

Interruption of antiretroviral therapy may increase risk of HAART resistance and lead to poorer viral load suppression. Of patients on HAART at anytime during 2006, 15% (18/123) had experienced interruption of HAART. Chart review indicated that 28% (5/18) of patients had insurance issues that led to interruptions in HAART. Other reasons documented for HAART interruption included forgetting, losing or running out of medications, side effects, and substance abuse. The majority of HAART interruptions lasted less than 2 weeks (40%), while 17% lasted more than 3 months (Table 12).

**Table 12. Duration of HAART interruption, Among Patients with HAART interruption**

	% of Patients with HAART Interruption in 2006 N= 18
Less than 2 weeks	39% (7)
2 weeks to 1 month	22% (4)
1 to 3 months	22% (4)
More than 3 months	17% (3)

### 6.4.3 Last HAART Regimen in Year among Patients Ever on HAART in 2006

Of the 427 patients on HAART at anytime, we collected information on the last HAART regimen in 2006 (Table 13). Ninety-seven percent (414/427) of all patients were on at least 3 antiretroviral drugs as recommended. The majority of recently diagnosed patients were on 3 drugs (84%), while among continuing care patients, 58% were on 3 drugs, 27% were on 4 drugs, and 10% were on 5 drugs. Drug regimens were categorized into PI only (56%), on NNRTI with no PIs (41%), and on NRTI only (3%). Recently diagnosed patients were more likely to be on NNRTI with no PIs, while continuing care patients were more likely to be on PIs only.

<b>Table 13. Last HAART Regimen in 2006 (of those on HAART at anytime in Year) among Recently Diagnosed and Continuing Care Patients</b>			
	<b>Recently Diagnosed</b>	<b>Continuing Care Patients</b>	<b>Total Sample</b>
	<b>N=159</b>	<b>N=268</b>	<b>N=427</b>
<b>Last HAART Regimen***</b>			
On PI	43% (69)	64% (171)	56% (240)
On NNRTI (no PI)	56% (89)	32% (86)	41% (175)
On NRTI only	1% (1)	4% (11)	3% (12)
<b>Number of Drugs in Regimen***</b>			
2	1.3% (2)	4% (11)	3% (13)
3	84% (134)	58% (155)	68% (289)
4	13% (21)	27% (72)	22% (93)
5	1.3% (2)	10% (27)	7% (29)
6	-	1% (3)	0.7% (3)

\*\*\* $p < 0.0001$

NRTI = Nucleotide reverse transcriptase inhibitors; NNRTI = Non-nucleoside reverse transcriptase inhibitor; PI=Protease inhibitor

### 6.4.4 Ever Resistance Testing

Patients who are HAART naïve or patients who have failed or not responded to antiretroviral therapy may benefit from drug resistance testing. Testing prior to initiating HAART may inform the choice of drugs to prescribe for patients newly starting therapy to avoid the potential of putting patients on drugs to which they have resistance. Further, resistance testing may also help identify potential cause of treatment failure and poor treatment response and suggest the need for a change in drug regimen.

Of all patients reviewed and alive throughout 2006 (N=670), 55% (365/666) had ever had a resistance test done, with a greater proportion of recently diagnosed patients (65%) with any resistance test documented compared to continuing care patients (47%) ( $p < 0.0001$ ). Among patients newly diagnosed and alive in 2006, 76% (67/88) had a resistance test documented in charts.

## 6.5 Tuberculosis/PPD Screenings <sup>(RD)</sup>

Although the incidence of tuberculosis has slightly decreased in recent years, disparities still exist among subpopulations, including foreign born and certain racial and ethnic minorities. Individuals with HIV have a much greater risk of progression to active tuberculosis than those with non compromised immune systems.<sup>7</sup> Therefore, screening of TB is necessary to ensure early detection and treatment of latent TB infection to prevent active disease and ensuing complications to HIV disease.

Among recently diagnosed patients (2003-2006) alive with 2 or more visits in 2006, and diagnosed on or before 6/30/06, without history of TB or a previously positive PPD, 35% (54/154) were screened in 2006, and an additional 9% (14/154) had skin tests planted but did not return for reading (Table 14). A few sites including Fenway (53%), Zinberg (58%), Great Brook (70%), and Whittier (75%) had slightly higher rates of TB/PPD screening than others.

<b>Table 14. Tuberculosis/PPD Screening Rates Among Eligible Recently Diagnosed Patients (2003-2006)</b>	
<b>Recently Diagnosed Patients Eligible for TB Screen 2006 (N=154)</b>	
TB/PPD Screening	35% (54/154)
Positive PPD	13% (7/54)

Of the 54 patients screened with results in chart, 13% (7) had a positive PPD. Of these 7 patients with a newly positive PPD, 86% (6) were treated or undergoing treatment and all received a chest X-ray. The treatment status of the one remaining patient was unclear from the chart review. Five percent of US born patients were positive, compared to 18% of foreign born patients, though this difference did not reach statistical significance. In addition, it should be noted that six of the 7 (86%) positive PPDs were among foreign born patients.

The HRSA/HAB proposed draft 2<sup>nd</sup> tier guidelines suggest ever having been screened for TB since diagnosis as criterion for this measure. In evaluating ever receipt of TB screening as of 2006 among recently diagnosed patients with no prior history of TB or positive PPD, we found that 69% (132/191) had been screened at least once since 2002, 8% (15/191) had a PPD planted but not read, and 32% (44/191) had no documentation of ever receiving a PPD screen.

(RD) = Data on Recently Diagnosed Patients Only

## 6.6 Sexually Transmitted Diseases Screenings (Gonorrhea, Chlamydia, Syphilis) <sup>(RD)</sup>

Sexually transmitted diseases (STD), which remain largely asymptomatic, increase the risk for HIV transmission. Thus, early detection and treatment via routine screenings are important to prevent both STD and HIV infections. Currently, the IHI goal is that at least 90% of HIV patients are screened for syphilis annually, although no national benchmarks or targets yet exist for gonorrhea or chlamydia screenings.

Data on STD screenings in 2006 were collected during the chart review for patients newly diagnosed during 2003 to 2006. In 2006, 38% of recently diagnosed patients were screened for gonorrhea, 38% were screened for chlamydia, and 69% were screened for syphilis (Table 15). Although the overall rate of syphilis screening was higher than gonorrhea or chlamydia, nevertheless, there remains the need for improvement to reach the IHI target of 90%.

<b>Table 15. Rates of STD Screenings in 2006 Among Recently Diagnosed Patients (2003 to 2006)</b>			
	<b>Recently Diagnosed (N=175)</b>	<b>Males (n=103)</b>	<b>Females (n=71)</b>
Gonorrhea screening***	38% (67)	25% (26)	58% (41)
Chlamydia screening***	38% (66)	23% (24)	59% (42)
Syphilis screening	69% (120)	73% (75)	63% (45)
*** $p < 0.0001$			

Since rates of STD screenings were not gathered for those diagnosed or entered care in 2002 or earlier, no comparisons between recently diagnosed and continuing care patients were made. However, differences in rates by gender, place of birth, and race-ethnicity were evaluated. Females were much more likely to be screened for gonorrhea and chlamydia than males ( $p \leq 0.0001$ ). White non-Hispanics (79%) were more likely to be screened for syphilis than Hispanics (65%) or Black non-Hispanics (62%) ( $p < 0.05$ ).

## 6.7 Glucose & Cholesterol Screenings <sup>(RD)</sup>

Metabolic changes frequently occur in HIV patients and may affect general health and HIV-related morbidity. A study by Jacobson et al (2006) found that 25% of a population of HIV patients on HAART exhibited at least three of the following conditions, including hypertriglyceridemia, low high-density lipoprotein cholesterol, hypertension, abdominal obesity or high serum glucose, which indicate metabolic syndrome.<sup>8</sup> Therefore, these metabolic changes should be monitored as they may be side effects of HAART that need to be addressed and treated.

(RD) = Data on Recently Diagnosed Patients Only

**Table 16. Rates of Glucose and Cholesterol Screenings in 2006 Among Recently Diagnosed Patients (2003-2006)**

Recently Diagnosed Patients N=175	
Glucose screening	95% (167)
Cholesterol screening	81% (142)

Overall, 95% of recently diagnosed patients had received at least one blood glucose test in 2006. Rates of cholesterol screening were relatively lower at 81% (Table 16). In examining rates of cholesterol testing by HAART treatment status, we found that among patients who were on HAART at any time in 2006, 86% had at least one lipid panel performed, compared to 69% of patients never on HAART ( $p < 0.01$ ).

### 6.8 Influenza Vaccine <sup>(RD)</sup>

The USPHS guidelines recommend annual influenza immunization for people living with HIV/AIDS.<sup>9</sup> However, there remains some controversy surrounding the use of flu vaccine in patients with low CD4 counts who may not benefit from or respond to vaccine. Thus, individual clinics or providers may sometimes withhold the vaccine from seriously immuno-compromised patients. Although generally administered in the fall before the flu season, coverage was considered complete if there were any documentation of a dose of influenza vaccine given during 2006.

Of 175 recently diagnosed patients, 65% (113) had documented receipt of a dose of flu vaccine in 2006 (Table 17). Foreign born patients (70%) were more likely to receive a flu vaccine than US born patients (56%), although this did not reach statistical significance ( $p = 0.06$ ). No other differences were found by gender or race-ethnicity. We also examined rates of influenza vaccine by lowest and last CD4 count in 2006. No difference was found between patients with lowest CD4 > 200 and those with lowest CD4 ≤ 200. A smaller proportion (55%) of patients with last CD4 ≤ 200 received an influenza vaccine in 2006 than patients with last CD4 > 200 (66%), but this difference was not statistically significant.

**Table 17. Rate of Influenza Vaccination in 2006 Among Recently Diagnosed Patients (2003-2006)**

Recently Diagnosed Patients 2006 N=175	
Influenza vaccine	65% (113)

(RD) = Data on Recently Diagnosed Patients Only

## B. ONE-TIME CLINICAL INTERVENTIONS

### 6.9 Pneumovax

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 a pneumococcal vaccine was ever administered. Therefore, these data carry forward throughout the review years. While some guidelines now recommend revaccination every 5 years, there remains enough ongoing controversy that the criterion of ever vaccinated regardless of time since administration was used.

As of 2006, 87% of all patients reviewed (alive, with 2 or more visits, and diagnosed on or before 6/30/06) had ever received a pneumovax (Table 18). Ninety-three percent of patients in the continuing cohort have documented pneumovax, compared to 78% of patients who were recently diagnosed between 2002 and 2006 ( $p < 0.0001$ ). Among the 22% (49) of recently diagnosed patients without documentation of ever receiving a pneumovax, about 73% (36/46) were diagnosed in 2005 and 2006. Thus, it is important to follow up in subsequent reviews to determine whether these more recently diagnosed patients have received a pneumococcal vaccine.

<b>Table 18. Rate of Ever Receipt of a Pneumococcal Vaccination as of 2006 among Recently Diagnosed Patients (2003-2006)</b>			
	<b>Recently Diagnosed Patients N=224</b>	<b>Continuing Cohort N=316</b>	<b>Total Sample N=540</b>
Ever Pneumococcal Vaccine***	78% (175)	93% (294)	87% (469)

\*\*\* $p < 0.0001$

## 6.10 Viral hepatitis screening and immunization

Viral hepatitis screening is an important component of quality HIV care, since viral hepatitis and toxicities from antiretroviral drugs may interfere with HIV management. Screenings for these infections are necessary to appropriately prescribe HAART for patients with known co-infections and to immunize susceptible patients to prevent the complications of HIV and viral hepatitis co-morbidity. Table 19 summarizes rates of viral hepatitis screening, immunization, and treatment.

<b>Table 19. Rates of Viral Hepatitis Screening, Immunization, &amp; Treatment in 2006</b>			
	<b>Recently Diagnosed N=224</b>	<b>Continuing Cohort N=316</b>	<b>Total Sample N=540</b>
Hepatitis B			
Screening	98% (219)	98% (311)	98% (530)
Positive	54% (118)	52% (162)	53% (280)
Vaccinated (of HBV-)*	72% (73)	83% (123)	78% (196)
Hepatitis C			
Screening	98% (220)	97% (308)	98% (528)
Positive	9% (20)	37% (113)	25% (133)
Ever Treatment (of +) *	5% (1)	27% (30)	23% (31)
Hepatitis A			
Screening**	94% (210)	83% (263)	88% (473)
Positive**	61% (129)	47% (124)	53% (253)
Vaccinated (of HAV-)	69% (56)	78% (108)	75% (164)

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , + $p < 0.0001$

### 6.10.1 Hepatitis B (HBV)

Patients susceptible to hepatitis B or patients with no evidence of prior HBV infection should be immunized against HBV. Overall, the rate of hepatitis B screening was very high at 98% (530/540). Of all patients screened, 53% (280/530) were HBV positive, with no difference between the two groups. Among patients who screened negative and were susceptible to HBV infection, 78% received at least one dose of hepatitis B vaccine, with recently diagnosed patients (72%) less likely to be vaccinated than continuing care patients (83%) ( $p=0.05$ ). Among susceptible patients, no differences in rates of hepatitis B vaccination were noted by gender or place of birth. However, Hispanics (88%) were more likely to have at least one dose of HBV vaccine than White non-Hispanics (76%) or Black non-Hispanics (73%) ( $p=0.02$ ). It should be noted that while we counted receipt of any one dose of vaccine as receiving the vaccination due to constraints of chart review data extraction, the recommendation is for the complete 3 dose of the hepatitis B vaccination series as proposed in the draft 2<sup>nd</sup> Tier HRSA HAB HIV clinical performance measures.

### **6.10.2 Hepatitis C (HCV)**

Ninety-eight percent (528/540) of patients were ever screened for hepatitis C by 2006, thus surpassing the IHI target of 95%.<sup>10</sup> The positivity rate was 25%, with continuing care patients (37%) about 4 more times more likely to be hepatitis C positive than recently diagnosed patients (9%) ( $p < 0.0001$ ). The overall treatment rate for patients who were HCV positive was 23%, with continuing care patients (27%) 5 times more likely to ever have been treated compared to those in the recently diagnosed cohort (5%) ( $p < 0.05$ ). Of the 102 HCV positive patients who were never treated, 24% (24) had a hepatitis C viral load done and 13% had hepatitis C genotyping done, indicating that HCV monitoring is in progress. Further, 58% (59) were ineligible and 9% (9) refused treatment. Of the 59 patients deemed ineligible for HCV treatment, the predominant reasons were hepatitis C viral load below detectable level (39%) or patient had active alcohol or substance use (34%) that contraindicated treatment. Concurrent medical problems (such as severe depression or mental illness, liver disease, low CD4 count) were other reasons for HCV treatment ineligibility.

### **6.10.3 Hepatitis A (HAV)**

Eighty-eight percent (473/540) of patients were ever screened for hepatitis A, while 3% were given a vaccine but not screened, and another 10% of patients had neither been screened nor vaccinated. Among those tested, 53% (253/473) were positive for hepatitis A, with recently diagnosed patients (61%) much more likely to be positive than continuing care patients (47%), with  $p < 0.01$ . Of patients who screened negative and thus were susceptible to HAV infection, about 75% had subsequently been vaccinated, with no significant difference between recently diagnosed (69%) and continuing care patients (78%). Among susceptible patients, no differences in rates of HAV vaccine were noted by place of birth or race-ethnicity. However, males (81%) were much more likely to receive any dose of the HAV vaccine than females (65%) ( $p = 0.008$ ). It should be noted that while we counted receipt of any one dose of vaccine as receiving the vaccination due to constraints of chart review data extraction, the recommendation is for the complete 2 dose of the hepatitis A vaccination regimen as proposed in the draft 3<sup>rd</sup> Tier HRSA HAB HIV clinical performance measures.

## C. GENDER-SPECIFIC CLINICAL INTERVENTIONS

### 6.11.1 Breast Cancer Screenings <sup>(RD)</sup>

Women age 40 and over should receive breast cancer screening via a mammography each year. A total of 169 women met the age criteria during 2006 for mammography screening. Among these, forty-nine (29%) were recently diagnosed and 120 (71%) were in the continuing patients. However, data on mammography were collected on patients diagnosed from 2003 onwards only. Of the 31 women recently diagnosed between 2003 and 2006 with 2 or more visits who met the age criteria for mammography in 2006, we found that 58% (18/31) were screened for breast cancer.

### 6.11.2 Cervical Cancer Screenings

The CDC currently recommends that all HIV-positive women be screened for cervical cancer via a Pap smear upon positive diagnosis and annually thereafter. More frequent screenings of every 6 months are recommended for women with prior abnormal Pap results, symptomatic HIV infection, or indications of HPV infection. The IHI goal is that at least 90% of women with HIV infection would receive a Pap smear in a review year.

Among our sample of female patients alive with 2 or more visits in 2006, 70% (164/233) had documentation of receiving a Pap smear (or colposcopy) during the year, with no difference between recently diagnosed and continuing care patients (Table 20). Given the IHI goal of 90%, there remains opportunity for improvement. Rates of Pap smears at most sites averaged 70% with no distinct outliers.

High rates of abnormal Pap smears were found (26%), with similar rates of abnormal Pap smears noted between recently diagnosed (25%) and continuing care patients (26%). Of patients with abnormal results, about 95% were referred for colposcopy or further consultation.

<b>Table 20. Rate of Pap Smears, Abnormal Pap, and Referrals in 2006 Among Recently Diagnosed &amp; Continuing Care Patients</b>			
	<b>% of Recently Diagnosed Patients N=91</b>	<b>% Continuing Cohort N=142</b>	<b>Total Sample N=233</b>
Pap Smear	71% (65)	70% (99)	70% (164)
Abnormal Pap	25% (16/65)	26% (26/99)	26% (42/164)
Referrals for Abnormal Pap	94% (15/16)	96% (25/26)	95% (40/42)

### 6.11.3 Pregnancies in 2006

Of 233 female patients, 8% (18) had a documented pregnancy in 2006. Fourteen (78%) of these were among recently diagnosed patients. Except for three terminated pregnancies, 100% of females who were pregnant in 2006 were on antiretroviral therapy, as recommended by USPHS guidelines to reduce the risk of mother to child HIV transmission.

(RD) = Data on Recently Diagnosed Patients Only

## VII. CLINICAL OUTCOMES:

### COMPARISONS BETWEEN RECENTLY DIAGNOSED & CONTINUING COHORT

To assess immune function and virologic response to antiretroviral therapy, we collected data on all CD4 counts and viral loads along with dates of these tests for each patient reviewed. The last viral load (among all patients on HAART at last visit) and the last CD4 count obtained in 2006 were used to evaluate clinical outcome performance. Frequency of always having viral suppression (less than or equal to 400 copies/ml) in year was also ascertained for patients on HAART at any time in year. Patients diagnosed in 2006 were excluded for this indicator, since the majority (90%) did not have viral suppression at entry to care, and including them would artificially reduce the rate of always viral suppression.

#### 7.1 Virologic Suppression among Patients on HAART

About 77% of patients were on HAART at last visit in 2006, with patients in the continuing cohort (83%) significantly more likely to be on HAART at last visit ( $p < .0001$ ) than recently diagnosed patients (68%) (Table 21). Among those on HAART at last visit, 87% had an undetectable last viral load of less than or equal to 400. Recently diagnosed patients (91%) tended to have higher rate of last VL $\leq$ 400 than patients in the continuing care cohort (85%), though the difference was not significant ( $p = 0.09$ ).

Table 21. Last Viral Load in 2006 (among on HAART at Last Visit) & Rates of Viral Suppression Throughout 2006 (among on HAART ever during Year) By Recently Diagnosed and Continuing Care Patients			
	Recently Diagnosed 2006 N=224	Continuing Care 2006 N=316	Total Sample 2006 N=540
<i>On HAART at Last Visit***</i>	68% n=153	83% n=262	77% N=415
Last VL $\leq$ 400	91% (137/151)	85% (220/259)	87%
<i>On HAART anytime in 2006** (Excluding patients diagnosed in 2006)</i>	72% n=130	85% n=268	80% N=398
Frequency of VL $\leq$ 400			
Always	70% (91)	71% (190)	71% (281)
Sometimes	24% (31)	16% (44)	19% (75)
Never	6% (8)	12% (31)	10% (39)
No viral loads measured	0% (0)	1% (3)	.75% (3)

\*\* $p < 0.001$ , \*\*\* $p < 0.0001$

Among patients on HAART at anytime in year, approximately 71% maintained viral suppression throughout 2006, while 10% never achieved undetectable viral loads. No differences in rates of viral suppression were observed between recently diagnosed (70%) and continuing care patients (71%). Further, no differences by gender, place of birth, or race or ethnicity were identified. Overall, rates of viral

suppression throughout the year among patients ever on HAART in 2006 (71%) were slightly lower than the measure of last viral load  $\leq 400$  in year (87%).

In examining viral load suppression by year of HIV diagnosis in the recently diagnosed cohort including patients diagnosed in 2006, we observed that those with an earlier diagnosis date or a greater length of time in care were more likely to maintain undetectable viral loads throughout the year. Compared to 81% of patients diagnosed in 2002 who always had VL $\leq 400$  in 2006, 65% of patients newly diagnosed in 2005 maintained undetectable viral loads in 2006. Further, as expected, only 3% of patients diagnosed in 2006 always had undetectable viral loads, since they were not on antiretroviral treatment and most had VL $>400$  at entry to care (Table 22).

<b>Table 22. Rates of Viral Suppression in 2006 among Recently Diagnosed Patients By Year of HIV Diagnosis</b>						
	Year Patient First Diagnosed HIV+					Total N=159
	HIV+ 2002 N=36	HIV+ 2003 N=49	HIV+ 2004* N=5	HIV+ 2005 N=40	HIV+ 2006 N=29	
Viral suppression in 2006						
Always $\leq 400$	81%	67%	60%	65%	3%	58%
Sometimes $\leq 400$	17%	24%	40%	28%	83%	35%
Never $\leq 400$	3%	8%	-	7%	14%	8%

\*Few patients newly diagnosed in 2004 were reviewed across all sites.

## 7.2 Immune Function – Last CD4 Count in 2006

We ascertained immune function using the last CD4 count measured in 2006. About 87% of patients in 2006 had last CD4 $>200$  (Table 23). No differences in last CD4 count were observed among recently diagnosed patients (89%) and continuing care patients (86%). Among those recently diagnosed, US born patients (93%) tended to have a higher rate of last CD4  $> 200$  than foreign born patients (86%), although this was not statistically significant at  $p=0.10$ . However, White non-Hispanic patients (96%) were much more likely to have a last CD4 $>200$  than minorities (86%) ( $p<0.02$ ). Roughly 87% of Black non-Hispanics and 82% of Hispanics had last CD4 $>200$  in 2006.

<b>Table 23. Percentage of Patients with Last CD4<math>&gt;200</math> among Recently Diagnosed and Continuing Care Patients</b>			
	Recently Diagnosed 2006 n=224	Continuing Care 2006 n=316	Total Sample 2006 N=540
Last CD4 $>200$	89% (199/223)	86% (265/308)	87% (464/531)

### 7.3 Incidence of Related Infections in 2006 among Recently Diagnosed Subset <sup>(RD)</sup>

Among the recently diagnosed subgroup, we assessed the occurrence of any diagnoses of related infections (including opportunistic infections, tuberculosis, acute HAV, and IDU-related endocarditis, and STDs) in 2006. There were 19 cases of new STDs in 2006 and 10 cases of opportunistic infections (OIs) or AIDS-related cancers among those diagnosed between 2003 and 2006. No other incident infections were noted (Table 24).

<b>Table 24. Rates of Incident Infections Among Recently Diagnosed Patients (2003-2006)</b>	
	<b>Recently Diagnosed Patients 2006 N=175</b>
STDs	11% (19)
Tuberculosis	-
Acute HAV	-
IDU-related endocarditis	-
Opportunistic infections	6% (10)

Of the 19 cases of new STDs in 2006, 42% or 8 were among patients newly diagnosed HIV positive in 2006. Ten of these 19 cases of STDs were syphilis, while the remaining included GC, chlamydia, trichomoniasis, and herpes. Five of the 10 cases of opportunistic infections were among patients newly diagnosed in 2006. Pneumocystis pneumonia (PCP), esophageal candidiasis, Kaposi sarcoma, and cryptococcal meningitis were among some of the OIs documented.

(RD) = Data on Recently Diagnosed Patients Only

#### 7.4 All-Cause Hospitalizations in 2006

Episodes and causes of hospitalizations were assessed during the chart review. As documentation of hospitalizations varied by site, rates of ever been hospitalized in year may likely be an underestimate of the actual number of hospitalizations.

In 2006, approximately 16% (85/540) of patients had documentation of at least one hospitalization, with no difference between recently diagnosed (17%) and continuing care (15%) patients. However, recently diagnosed US born patients (24%) were significantly more likely to have ever been hospitalized in 2006 ( $p < 0.05$ ), than recently diagnosed foreign born patients (13%). This difference reached borderline significance in the continuing cohort. Also, as expected, patients with an AIDS-defining condition were much more likely to be hospitalized in the year ( $p < 0.05$ ). Table 25 lists and demonstrates the wide range of causes for patient hospitalizations in 2006.

Table 25. Types of Hospitalizations in 2006					
	Total Sample 2006 N=540			Total Sample 2006 N=540	
HIV/AIDS Related Conditions	1.5%	(8)	Infectious	6.3%	(34)
Allergic RX	0.0%	(1)	Musculoskeletal	0.6%	(3)
Cardiovascular	2.4%	(13)	Neoplasm (Non-AIDS)	0.4%	(2)
Dermatologic	0.6%	(3)	Nephrologic	0.9%	(5)
Drug Rx	0.2%	(1)	Neurologic	2.2%	(12)
Endocrine	0.7%	(4)	OB	1.5%	(8)
Genitourinary	0.2%	(1)	Psych	0.7%	(4)
Gastrointestinal	2.4%	(13)	Respiratory	2.8%	(15)
GYN	0.7%	(4)	Substance abuse	0.9%	(5)
Hematologic	0.6%	(3)	Surgical	0.2%	(1)
Hepatic	0.6%	(3)			

## VIII. CONCLUSIONS

Overall, this report provides a comprehensive description of patient demographics, care processes, and clinical outcomes in 2006 among traditionally underserved patients receiving care across 9 sites funded by the Boston Public Health Commission through the Ryan White HIV/AIDS Treatment Modernization Act, with an emphasis on those newly diagnosed and newly entering care between 2002 and 2006.

Among recently diagnosed patients, over half were unaware of their risk for HIV prior to testing. A substantial proportion of patients (~34%) presented with clinical symptoms, OIs, or related diagnoses of TB/HCV/STDs at HIV testing, suggesting the need for targeted outreach to educate and encourage testing among higher risk groups. To contain and prevent further HIV transmission, providers need to educate patients about risk reduction (safer sex and drug use behaviors) and offer partner counseling and referral services. Nearly 80% of patients had PCRS at intake. Further, almost 90% of patients received risk reduction counseling on safer sex and/or drug use practices.

High rates of clinical performance in 2006 on measures such as HAART use, PCP prophylaxis, hepatitis screenings, and CD4 counts were observed, in most cases meeting or surpassing national benchmarks or guidelines. However, some differences in care processes were found between recently diagnosed patients and those diagnosed prior to 2002. Specifically, rates of one-time interventions, such as pneumococcal and hepatitis B vaccination, were slightly lower among recently diagnosed patients. Continued tracking of these patients in the next review cycle will determine whether these one-time services were provided after 2006. Achievements that ought to be noted include the high rate of HAART use among eligible patients and the overall high rates of adherence assessment and support.

Several areas with potential for improvement include tuberculosis or PPD screenings (35% in 2006 or 69% ever screened), influenza vaccinations (65%), and STD screenings in year. In 2006, the positivity rate for TB was 13%, with six of the 7 positive PPDs among foreign born patients. Given the growing proportion of foreign born patients as reflected in our recently diagnosed cohort, better rates of TB screening overall is necessary to detect latent infections to prevent progression to active TB. Screening rates for STDs (38% for gonorrhea and chlamydia) were low in our sample, though females were more likely to receive gonorrhea and chlamydia screenings than males. Though nearly 70% of patients were screened for syphilis, this is still lower than the IHI target of 90%. Finally, rates of Pap smears (70%) also did not reach the IHI goal of 90%, and given that nearly a quarter of Pap smears were abnormal, the need to improve routine cervical cancer screening is even more crucial.

Clinical outcomes including viral load suppression and CD4 counts were similar between recently diagnosed and continuing care patients. Impressive rates of viral suppression were observed, with 71% of patients (among ever on HAART in year) maintaining viral loads of less than 400 throughout 2006, and 87% of all patients (on HAART at last visit) with a last VL $\leq$ 400. Rates of hospitalizations were also similar between the two groups, with 16% of all patients having been hospitalized at least once in year.

In addition to examining differences between recently diagnosed and continuing care patients, we also reported on disparities in care processes and outcomes by gender, place of birth, and race-ethnicity where they existed. Findings from this quality management project may be used to develop initiatives or projects to improve indicators where overall performance was low (TB screening, Pap smears, STD screenings), with attention to addressing differences between patient subgroups. Clinics may find it useful to develop quality initiatives collaboratively and share progress updates throughout the implementation, since combined efforts will likely produce greater overall improvements across sites.

Lastly, a few limitations should be mentioned. Due to diverse patient and site characteristics across the 9 clinics, aggregate performance rates may not necessarily be generalizable to individual sites. Results presented in this report represent data from all sites combined and thus should be interpreted within this context. Further, as this was a retrospective review of clinical care, data presented describe process and outcomes two years past, and thus may not necessarily represent current practices since changes may have occurred in the interim. Finally, some comparisons between recently diagnosed and continuing care patients were not possible due to limited data availability. Despite these, continuous monitoring of clinical performance and patient health outcomes, attuning to changing standards of care guidelines and recommendations, and adapting systems accordingly, are necessary to deliver quality care, reduce disparities, and ensure optimal health and quality of life for persons living with HIV/AIDS.

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## Appendix

Summary Table of Process & Outcome Measures By Patient Subgroups					
	Recently Diagnosed N=224	Continuing Cohort N=316	All Patients N=540	Standards or Guidelines	Comments
<b>Clinical Process Measures</b>					
<b>Medical Visit</b> At least one in 2 or More Trimesters	79% (209)	80% (297)	80% (506)	None.	N=635 for total, see p.13
<b>CD4 Counts</b> At least 2 in year that are 3 months apart*	90% (201)	83% (201)	86% (462)	IHI Goal: 90% CD4 done at least every 6 months	High Performance (our criterion of 3 months apart more restrictive)
<b>PCP Prophylaxis</b> Eligible for PCP Prophylaxis	27% (61)	24% (76)	25% (137)		
On Prophylaxis (among eligible)**	100% (61/61)	89% (68/76)	94% (129/137)	IHI Goal: 95% of eligible patients on prophylaxis	High Performance Continuing care patients less likely to be on treatment
<b>Antiretroviral Therapy</b> HAART eligible+	78% (174)	90% (283)	85% (457)		
On HAART (of eligible)	91% (159)	95% (268)	93% (457)	IHI Goal: 90% of eligible patients on HAART	Performance ACHIEVED
<b>Tuberculosis Screening in 2006</b> TB/PPD Screening Positive PPD	35% (54/154) 13% (7/54)	-	-	HRSA draft 2 <sup>nd</sup> tier: TB screened since diagnosis	69% screened at least once since 2002. In 2006, 7 positives (13%), with 6 among foreign born.
<b>STD Screenings in 2006</b>  Gonorrhea screening Chlamydia screening Syphilis screening	38% (67) 38% (66) 69% (120)	-	-	IHI Goal: 90% screened for syphilis None for GC or chlamydia	Higher rates of GC and chlamydia screening among females.  Opportunity to IMPROVE
Glucose screening	95% (167)	-	-		
Cholesterol screening	81% (142)	-	-		Patients on HAART more likely to be screened
<b>Vaccinations</b>					
Influenza vaccine	65% (113)	-	-	Once every year.	Opportunity to IMPROVE.

Please refer to text for further information on any of the indicators presented in the table above.

\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ , + $p < 0.0001$  (significant difference between recently diagnosed and continuing care cohort)

	Recently Diagnosed N=224	Continuing Cohort N=316	All Patients N=540	Standards or Guidelines	Comments
Ever Pneumococcal Vaccine+	78% (175)	93% (294)	87% (469)	Once within past 5 years.	Measured as ever received in this analysis. Rate was lower among recently diagnosed patients.
<b>Hepatitis Screening &amp; Vaccines</b>					
Hepatitis B					
Screening HBV Positive Vaccinated (HBV-)* any dose	98% (219) 54% (118) 72% (73)	98% (311) 52% (162) 83% (123)	98% (530) 53% (280) 78% (196)	Draft HRSA Tier 2: Complete series of HBV vaccine (3 dose)	High Performance on Screening. Vaccination rate: Opportunity to IMPROVE. Lower rates among recently diagnosed patients.
Hepatitis C					
Screening HCV Positive+ Ever Treatment (of positive) *	98% (220) 9% (20) 5% (1)	97% (308) 37% (113) 27% (30)	98% (528) 25% (133) 23% (31)	IHI Goal: 95% screened	High Performance on Screening.
Hepatitis A					
Screening** HAV Positive** Vaccinated (of HAV-) any dose	94% (210) 61% (129) 69% (56)	83% (263) 47% (124) 78% (108)	88% (473) 53% (253) 75% (164)	Draft HRSA Tier 3: Complete series of HAV vaccine (2 dose)	Screening rates lower among continuing care patients. Vaccination rates: Opportunity to IMPROVE
<b>Cervical cancer screenings</b>					
Pap Smear (of females)	71% (65)	70% (99)	70% (164)	IHI Goal: 90% of HIV+ women screened	Opportunity to IMPROVE.
Abnormal Pap (of Pap smears)	25% (16/65)	26% (26/99)	26% (42/164)		
Referrals for Abnormal Pap (of Abnormal Pap)	94% (15/16)	96% (25/26)	95% (40/42)		
<b>Risk Reduction Counseling</b>	87% (153)	-	-	At initial visit. At minimum yearly.	n=175

Please refer to text for further information on any of the indicators presented in the table above.

\*p≤0.05, \*\*p<0.01, \*\*\*p<0.001, +p<0.0001 (significant difference between recently diagnosed and continuing care cohort)

	Recently Diagnosed N=224	Continuing Cohort N=316	All Patients N=540	Standards or Guidelines	Comments
<b><i>Clinical Outcome Indicators</i></b>					
<i>On HAART at Last Visit***</i>	68% n=153	83% n=262	77% N=415		
Last VL≤400 (HAART at last visit)	91% (137)	85% (220)	87% (357)		
<i>On HAART ever in 2006**</i> (Excluding patients diagnosed in 2006)	72% n=130	85% n=268	80% N=398		
Frequency of VL≤400 (HAART ever)					
Always	70% (91)	71% (190)	71% (281)		
Sometimes	24% (31)	16% (44)	19% (75)		
Never	6% (8)	12% (31)	10% (39)		
No viral loads measured	0% (0)	1% (3)	.75% (3)		
Last CD4 >200	89%	86%	87%		

Please refer to text for further information on any of the indicators presented in the table above.

*\*p<0.05, \*\*p<0.01, \*\*\*p<0.001, +p<0.0001 (significant difference between recently diagnosed and continuing care cohort)*

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