Fiscal Year 2015 Outcome Measurement Report

March 1, 2015 – June 30, 2016

11/4/2016

Contents

Executive Summary

In Fiscal Year 2015 (FY 2015, 3/1/2015 – 2/29/2016), Boston Public Health Commission (BPHC) Ryan White Part A funded agencies served 5,534 clients through 12 service categories and 34 unique agencies. FY 2015 also marked the first year that BPHC collected client level outcomes through e2Boston, a cloud-based data system used by all Part A providers in the Boston Eligible Metropolitan Area (EMA). This report provides summary analysis of a sub-population of clients served during FY15 who also had at least one outcome report submitted between March 1, 2015 and June 30, 2016.

The primary characteristics among Part A clients with reported outcomes are as follows:

- 89% of clients are virally suppressed (≤ 200 viral copies/mL) and have a CD4 count over 200 cells/mL (n = 4,589)
- 46% of clients have no indication of mental health issues (n = 4,669)
- 91% of clients are stably housed (n = 4,850)
- 57% of clients possess a strong, personal support network (n = 4,640)
- 48% of clients visited an HIV medical provider within six months of receiving a service (n = 4,594)
- 64% of clients reported always attending HIV care visits (n = 4,491)
- 73% of clients routinely take all doses of prescribed medications (n = 4,664)
- 76% of clients experience no side effects from their HIV medication (n = 4,473)
- 84% of clients are active in a case management program, regardless of BPHC funding (n = 4,180)

Introduction:

The 2016 Outcome Measurement Report provides an overview of client level outcome data for people living with HIV (PLWH) that received a Boston Public Health Commission (BPHC) Part A funded service during Fiscal Year 2015 (March 1, 2015 – February 29, 2016) and who had an outcome report submitted before June 30th, 2016 . Data collection extended past the end of the fiscal year because outcome reports are submitted on a rolling basis. FY 2015 marks the first year BPHC is preparing this report from data collected by e2Boston; Suffolk University and John Snow Research & Training Institute, Inc. (JSI) were previously contracted to monitor outcomes. This report includes comparisons to previous outcomes data, summary data for clients receiving services in FY 2015, and selected statistical analyses to identify factors significantly associated with viral suppression in the Boston EMA.

Fiscal Year	**Total Outcome Reports**	**Total Unique Clients**
2015 (March 1, 2015 – February 29, 2016)	5,422	4,374
2016 (March 1, 2016 – June 30, 2016)	2,040	2,040
Total Outcomes in e2Boston	7,462	5,080*

*This total includes clients served in FY16

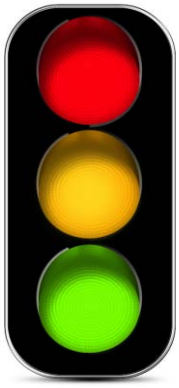
Methods

The Outcome Measurement System

Outcome reports are required for all clients receiving Ryan White Part A funded services. Client level outcome data was previously collected at the end of the 2nd and 4th quarters for all clients who accessed services during the preceding six month period. BPHC now collects client level outcomes data on a rolling basis rather than within two static reporting periods. This is also the first year in which providers are directly entering outcome scores into e2Boston.

The outcome module in e2Boston operates with several key differences:

- The outcome module utilizes a Client Clock model to determine eligibility for an outcome report. Whereas providers previously were unsure if they needed to submit an Outcome Report for clients within six months for any clients seen, e2Boston directly indicates which clients are due for an outcome report. The model is based off of a simple traffic light concept:

	Alert Color	Action Step for Provider
	RED: client is eligible and must be scored within 6 weeks or less	Client must be scored before countdown hits zero or client will be counted as "Missing". Missing 10% of outcome reports will result in reporting non-compliance.
	YELLOW: client is now eligible and provider has up to four months until the outcomes are due	An outcomes report should be completed before it becomes a RED alert. Providers can run a report to determine how many clients are eligible and work with other staff within the agency to make sure every client is scored.
	GREEN: client's outcome has either recently been reported and is not due at this time	The number of GREEN alerts shows providers how many clients have been scored, which help supervisors determine if their staff is up to date on outcome reports. It also prevents duplicate reporting if outcomes are already submitted.

- Eligibility for outcome reports is automatically tracked by e2Boston based on service utilization data. Under the prior system, providers would report an outcome for a client that did not receive a service within the last six months; there was no data source accessible to the provider to determine whether a client was considered eligible for an outcome measurement report.
- Since PLWH may receive services from multiple agencies funded by Part A, it is possible to receive multiple outcome reports (with varying scores among them). The JSI method scores multiple reports (across different agencies or even different programs within one large agency) for an individual were averaged together.
- With e2Boston, a client who receives multiple categories of service at one agency gets a single outcome report at that agency. Once it is submitted, no duplicate reports from the same agency are allowed.

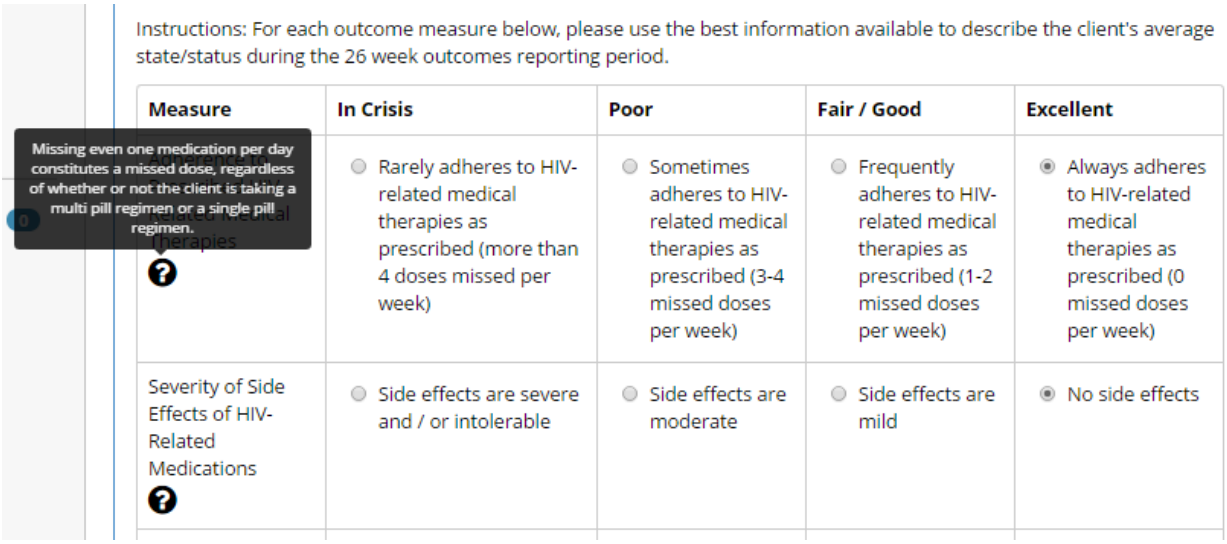
Outcome data can only be entered for PLWH that are already registered as clients within e2Boston. Providers submit outcomes for each client by manually, completing the outcome form within the client's record. For agencies with a higher volume of clients, a data import feature is available in e2Boston, allowing providers to extract data from an existing electronic health records or databases and then upload them into e2Boston. Currently, 33% of agencies import their outcome data into e2Boston.

Data elements within the outcome report include a combination of single-select options (e.g. excellent, fair/good, poor, and in crisis) or data entry boxes (i.e. viral load/CD4 count values, date of last medical visit).

There are 11 measurement variables in the Outcome Measurement report.

Outcome	**Result and Description**
Viral load	Date and value of most recent viral load
CD4 count	Date and value of most recent CD4 test
Access to support network	A support network may include friends, family, religious groups, or other peer groups from with the client obtains emotional, social, spiritual, or material support
Mental health status	Assesses the client's need, or lack thereof, for psychiatric or emotional support
Housing status	Assesses the stability and affordability of a client's living situation
Date of most recent visit with HIV medical provider	Assesses whether or not the client received HIV medical care within the last six months prior to the outcomes report
Care adherence	HIV-related appointments include medical appointments, mental health appointments, peer support, case management, and anything else related to care completion and/or support
Adherence to prescribed HIV-related medical therapies	Missing any dose of medication per day constitutes a missed dose
Severity of side effects of HIV-related medications	Measures the subjective experience of side effects from HIV medication
Medical Case Management status	Assesses if the client is active at any medical case management agency, whether funded by Part A or not

Providers can review definitions of each outcome and the type of data or information used to complete the outcome as pop-up messages (by clicking the bubble marked with a "?") in e2Boston.



How Outcomes Information was Gathered for this Report

Data used for the Outcome Measurement Report was gathered either from reports generated on the site or through a raw data extract directly from e2Boston.

Inclusion Criteria:

1. The client received at least one instance of Part A services during FY 2015 (March 1, 2015 – February 29, 2016)
2. At least one outcome report was submitted by a provider for that client during between March 1, 2015 and June 30, 2016.

A total of 92% clients that received services during FY 2015 had at least one outcome report submitted. BPHC staff deduplicated the final data set and only retained the most recent outcome score for each client. All data was tabulated in Microsoft Excel or Microsoft Access.

How data was classified for this report

Prior to FY 2015, JSI categorized outcomes into qualitative ranges of "Poor", "Fair", "Good", and "Excellent"; scores in these ranges were then converted to a 0-100 metric to standardize and eliminate differences in scores over time. A similar four-part scale was used to evaluate clients, which includes: In Crisis, Poor, Fair/Good and Excellent. This scale is applied to all outcomes, except viral load, CD4 count, date of last medical visit, and medical case management status.

Because the FY 2015 report uses a different scoring system, e2Boston data cannot be joined with JSI information to provide long term data. BPHC will begin comparing continuous cohorts of clients to track changes over time once a larger portion of clients have multiple outcome scores in e2Boston. The data in this report provides a snapshot of the most recent quality of life and health measurements available for clients served in FY2015.

For data analysis purposes, the previously described four-point scale was re-grouped into fewer, discrete sub-groups. For outcomes such as Viral Load monitoring, clients are grouped dichotomously as virally suppressed or not. Others utilizing the four-point scale, such as Housing Status, are grouped based on severity or acuity of needs; this may be more helpful for service planning and prioritization of clients that may be most vulnerable or in need for services, e.g. actively homeless clients vs. those housed, but requiring financial assistance. Variable grouping are listed in the Appendix.

Regression Analysis

Outcome data were sorted and analyzed using Microsoft Access and SAS (Enterprise 4.1) software. Chi square tests determined if outcome measure scores and demographic variables differed among suppressed and unsuppressed clients at alpha = 0.05. All outcome variables with statistical significance and additional demographic variables were added into a logistic regression model. Backwards selection eliminated several variables from the initial model, including: Gender, Long Term Survivor Status, and MCM Status. Factors were retained in the model at alpha=0.2. Observations were omitted that were missing values for any variables included in the model.

Overview of Results

Among clients served in FY2015, 5, 042 out of 5,534 clients had at least one outcome report submitted through e2Boston from March 1, 2015 to June 30, 2016. This represents 92% of clients that had service utilization reported. All results are reported as the percentage of clients whose records contained the specified variable.

Table 1 provides demographic information for clients included in this report. The demographics of all PLWH reported for outcomes are consistent with the HIV epidemiological and service profile for the Boston EMA.

Demographics of clients reported for outcomes vs. all clients that received a Part A service between 3/1/15 – 6/30/16	***Clients with Outcomes*** ***N = 5,042***	***All Clients receiving Services*** ***N = 5,534***
Gender		
Male	66%	67%
Female	33%	32%
Transgender	1%	1%
Hispanic or Latino/a		
Hispanic or Latino/a	31%	30%
Not Hispanic or Latino/a	69%	69%
Unknown/Unreported	<1%	1%
Federal Race Categories		
White	49%	50%
Black or African-American	35%	33%
Asian	2%	1%
Other	4%	4%
Unknown/Unreported	12%	13%
Risk Exposure*		
Men who have sex with men	33%	35%
Injecting drug users	16%	15%
Heterosexual contact	41%	46%
Other risk	2%	7%
Risk factor not reported or identified	8%	6%
Age		
Less than 20	1%	2%
20-44	29%	27%
45 and older	70%	71%

* Risk Exposure adds up to more than 100% because Risk Exposure is a multi-select category

Additional demographic information is provided for the following outcomes: viral load & CD4 count, mental health, and housing.

Viral Load & CD4 Count

A total of 4,539 out of 5,042 clients (90%) reported both viral load and CD4 count values.

Viral load & CD4 count	CD4 Count ≥ 200/mL	CD4 Count < 200/mL	Row Totals
Virally suppressed	4,077 (89%)	175 (4%)	4,252 (93%)
Virally non-suppressed	262(6%)	75 (1%)	337 (7%)
Column Totals	4,339	250	4,589 (100%)

Viral suppr ession among reported clients was high, with 93% of clients having a viral load value less than 200 copies/mL. 89% of all reported clients had a CD4 count greater than or equal to 200. Among 7% of non-suppressed clients, 6% had a CD4 count greater than or equal to 200. Only 1% of clients were reported as non-suppressed and had a CD4 lower than 200, representing a small, but important group of PLWH that require services to improve VL and CD4 values.

Demographics of virally suppressed, high CD4 clients vs. non-suppressed, low CD4 clients	***All Clients*** *N = 5,042*	***Suppressed, CD4 >200*** *N = 4,077*	***Non-suppressed, CD4 <200*** *N = 75*
Gender			
Male	66%	66%	58%
Female	33%	33%	40%
Transgender	1%	1%	2%
Hispanic or Latino/a			
Hispanic or Latino/a	31%	29%	37%
Not Hispanic or Latino/a	69%	70%	63%
Unknown/Unreported	<1%	<1%	0%
Federal Race Categories			
White	49%	49%	44%
Black or African-American	35%	34%	43%
Asian	2%	2%	0%
Other	4%	2%	5%
Unknown/Unreported	12%	2%	8%
Risk Exposure*			
Men who have sex with men	33%	34%	9%
MSM + IDU	1%	1%	0%
Injecting drug users	16%	15%	33%
Heterosexual contact	41%	41%	51%
Other risk	1%	4%	7%
Risk factor not reported or identified	8%	4%	0%
Age			
Less than 20	1%	1%	0%
20-44	29%	24%	35%
45 and older	70%	75%	65%

The demographic table compares the virally suppressed clients with high CD4 values vs. non-suppressed with low CD4 values; the first group is considered to have achieved viral suppression and is one indicator of success in treatment.

Several statistically significant differences are observed between suppressed and non-suppressed clients ($p < 0.05$):

- **Gender:** Non-suppressed, low CD4 clients were more likely to be female.

- **Race:** Suppressed clients were less likely to be black.
- **Risk Exposure:** Suppressed clients were more likely to indicate MSM as their risk exposure, and less likely to indicate IDU, compared to not suppressed clients. Clients in poor health were more likely to possess heterosexual risk exposure, which corresponds with the increased proportion of women present.
- **Age:** A larger proportion of clients were over the age of 45 among suppressed clients than non-suppressed clients.
- **Housing Status:** Unstably housed clients or those needing housing services were more likely to be virally unsuppressed.

Mental Health Status

A total 4,669 out of 5,042 clients (93%) reported information about mental health status.

Mental Health Status	% Total Reports
Severe to moderate/mild health issues	2,505 (54%)
No indication of mental health issues	2,164 (46%)
Total Reported	4,669 (100%)

Among those reported, 46% of clients showed no indication of mental health issues. Among 608 clients scored with the most severe need for mental health services, 362 (59%) were actively receiving mental health services. For 98 clients not actively receiving mental health services at the time, 85% were referred for mental health services.

Demographics of clients with excellent vs. poor/in crisis MH status	***All Clients*** *N = 5,042*	***Excellent MH*** *N = 2,164*	***In Crisis, Poor*** *N = 608*
Gender			
Male	66%	68%	61%
Female	33%	31%	37%
Transgender	1%	1%	1%
Hispanic or Latino/a			
Hispanic or Latino/a	31%	29%	32%
Not Hispanic or Latino/a	69%	71%	68%
Unknown/Unreported	<1%	<1%	<1%
Federal Race Categories			
White	49%	48%	52%
Black or African-American	35%	37%	37%
Asian	2%	2%	1%
Other	4%	3%	3%
Unknown/Unreported	12%	10%	8%
Risk Exposure*			
Men who have sex with men	33%	35%	38%
MSM + IDU	1%	1%	3%
Injected drug users	16%	12%	16%
Heterosexual contact	41%	42%	42%
Other risk	1%	1%	1%
Risk factor not reported or identified	16%	12%	6%
Age			
Less than 20	1%	1%	1%
20 - 44	29%	22%	32%
45 and older	70%	76%	67%

Several differences emerged between clients with no mental health issues and those in the two most severe categories (in crisis & poor):

- **Gender:** Males were more likely to indicate no mental health issues than females.
- **Age:** PLWH with excellent mental health were generally older than those with poor or in crisis mental health status.

Housing Status

A total of 4,850 out of 5,042 (96%) clients reported housing status information.

Housing Status	% Total Reports
Unstable Housing	432 (9%)
Stable housing, wants financial assistance	973 (20%)
Stable Housing	3,445 (71%)
Total Reported	4,850 (100%)

Housing information is also collected in e2Boston under client demographic information; therefore housing data is more complete than other data elements. Nearly 9% of clients were reported as unstably housed. Some examples of the potential living situations that are deemed unstable include, but are not limited to: the client was homeless, in a psychiatric hospital, staying on a friend's couch. One fifth of outcome reports indicated client were stably housed, but could use financial assistance to cover rent and/or utilities. However, a majority of clients (71%) were stably housed with no need for financial assistance.

Among 212 clients who are unstably housed or homeless, 48% were already received housing services to assist them in obtaining stable and/or permanent housing. Twenty-two out of 33 clients that were unstably housed or homeless not currently engaged in housing services were referred for services during the same period.

Table X: Demographics of stably vs. unstably housed clients	***All Clients*** *N = 5,082*	***Stable Housing*** *N = 3,445*	***Unstable Housing*** *N = 212*
Gender			
Male	66%	66%	69%
Female	33%	33%	30%
Transgender	1%	1%	1%
Hispanic or Latino/a			
Hispanic or Latino/a	31%	30%	35%
Not Hispanic or Latino/a	69%	70%	65%
Unknown/Unreported	<1%	1%	<1%
Federal Race Categories			
White	49%	51%	42%
Black or African-American	35%	35%	43%
Asian	2%	2%	1%
Other	2%	2%	4%
Unknown/Unreported	12%	10%	10%
Risk Exposure*			
Men who have sex with men	33%	35%	24%
MSM + IDU	1%	1%	2%
Injecting drug users	16%	14%	25%
Heterosexual contact	41%	41%	39%
Other risk	4%	4%	4%
Risk factor not reported or identified	5%	4%	6%
Age			
Less than 20	1%	1%	1%
20-44	29%	23%	35%
45 and older	70%	76%	64%

There are several differences between stably and unstably housed clients seen in FY2015.

- **Ethnicity:** Unstably housed clients were more likely to be Hispanic or Latino/a.
- **Race:** Unstably housed clients were more likely to be black and less likely to be white.
- **Risk Exposure:** Unstably housed clients were more likely to indicate IDU as their risk exposure, and are less likely to be MSM.
- **Age:** Unstably housed clients were typically younger than stably housed clients.

Access to Support Network

A total of 4,460 out of 5,042 (88%) clients reported information related to support networks.

Access to Support Networks	% Total Reports
No or limited support network	558 (12%)
Some level of access to support network	1,438 (31%)
Strong access to support network	2,644 (57%)
Total Reported	4,640 (100%)

Among clients reported, 12% indicated no or limited support networks in their lives, 31% of clients reported some level of access to a support network, and 57% of clients reported a high level of access to a support network.

Date of most recent visit with HIV Medical Provider

A total of 4,594 out of 5,042 clients (91%) reported information related to last medical visit date.

Retention in Medical Care	HRSA HAB definition: seen at least every 6 months	Seen at least every 12 months
Retained in medical care (was seen at recommended frequency)	2,186 (48%)	4,231 (92%)
Not retained in medical care (was not seen at recommended frequency)	2,408 (52%)	363 (8%)
Total Reported	4,594 (100%)	4,594 (100%)

The HRSA HAB performance measure definition for retention in medical care is a medical visit occurring at least once every six months. Of those reported, 48% visited a HIV medical care provider within six months of their outcome due date. However, that does not indicate that the client had seen a medical provider twice during a one-year period; multiple outcome reports will be needed to assess the true frequency of medical visits over time. When determining whether clients were truly not accessing any type of primary care services, expanding the timeframe to 12-months showed that 92% of reported clients had in fact attended a medical visit.

Adherence to HIV-related Care Visits (Care Adherence)

A total of 4,491 out of 5,042 of clients (89%) reported information about attending HIV-care visits.

Adherence to HIV-related Care Visits	% Total Reports
Not regularly attending scheduled HIV-care visits	1,627 (36%)
Always attends HIV care visits	2,864 (64%)
Total Reported	4,491 (100%)

Nearly 64% of clients reported always attending HIV care visits. Among 36% not regularly attending care visits, 3% were reported as completely unable to attend visits.

Adherence to Prescribed HIV-related medical therapies (Medication Adherence)

A total of 4,664 out of 5,042 clients (93%) reported information about HIV medication adherence.

Adherence to Prescribed HIV-Related Medical Therapies	% Total Reports
Misses 3 or more doses per week	358 (7%)
Misses 1-2 doses per week	911 (20%)
Always takes medication	3,395 (73%)
Total Reported	4,664 (100%)

A majority of clients (73%) reported always taking their medication; approximately one-fifth of clients reported missing 1-2 doses per week. A total of 358 clients (7%) missed three or more doses per week, indicating significant challenges with medication adherence.

Severity of Side Effects of HIV-Related Medications

A total of 4,473 out of 5,042 (89%) clients reported Severity of Side Effects information.

Severity of Side Effects of HIV-Related Medication	% Total Reports
Severe/intolerable side effects to mild side effects	1,095 (24%)
No reported side effects	3,378 (76%)
Total Reported	4,473 (100%)

Approximately three-quarters of all clients reported as not experiencing side effects. Among 24% of those reporting side effects from their HIV medications, a minority (3%) reported experiencing severe or intolerable side effects.

Medical Case Management Status

A total of 4,180 out of 5,042 clients (83%) reported information about using medical case management services.

Medical Case Management Status	% Total Reports
Not Active in Case Management	669 (16%)
Active in Case Management	3,511 (84%)
Total Reported	4,180 (100%)

A majority of clients (84%) were engaged in some type of medical case management service. A review of service utilization data in e2Boston showed that 2,730 out of 5,042 clients (54%) with an outcome report had accessed a BPHC-funded MCM service. Even for 16% of clients reported as not actively engaged in an MCM service, 70 of the 669 clients had MCM service utilization data reported in e2Boston during FY 2015. One possible explanation might be that those clients reported as not actively in MCM were discharged and reported as such for the outcomes; another is that the client did not understand the outcome question and indicated that they were not active in a MCM program to a non-MCM provider completing the outcome. Since clients can access multiple services at different agencies, providers may not automatically be aware that they are enrolled in MCM services without clients informing them or allowing that information to be accessed via the proper releases of information.

Factors associated with lack of viral suppression

Both univariate analysis and multivariate regression analysis were used to identify variables associated with lack of viral suppression. Of a total of 5,042 records, 431 were excluded from analysis due to incomplete data. Univariate analysis showed significant differences among several variables between the virally suppressed and unsuppressed populations.

Comparing quality of life indicators and demographics between suppressed and unsuppressed clients			
Demographic or Outcome Variable	***Virally Suppressed***	***Unsuppressed***	***P value***
	N = 4,265	*N = 346*	
Gender	%	%	0.01
Male	66	58	
Female	33	41	
Transgender	1	1	
Race Categories			.0004
White	51	42	
Black or African-American	35	44	
Asian	2	1	
Other	11	4	
Unknown/Unreported	1	9	
Hispanic or Latino/a			0.11
Hispanic or Latino/a	31	35	
Not Hispanic or Latino/a	69	65	
Unknown/Unreported	< 1	< 1	
HIV Risk Exposure			<.0001
Men who have sex with men	36	23	
Injected drug users	16	20	
Heterosexual contact	41	45	
Other risk	4	10	
Risk factor not reported or identified	3	2	
Age (years)			<.0001
44 or less	25	47	
45 and older	75	53	
Mental Health Status			<.0001
Has mental health issues	54	72	
No mental health issues	46	28	
Support Network Status			<.0001
Limited or poor support network	44	62	
Strong support network	56	38	
Housing Status			<.0001
Insecure housing or needs financial assistance	27	52	
Stable housing, no assistance required	73	48	

Multivariate regression analysis of factors related to HIV viral non-suppression			
Variable	Comparison	Odds Ratio	95% Confidence Interval
Age group (yrs)	Age <45 vs. age ≥ 45	2.610	2.060, 3.307
HIV risk exposure	IDU vs. MSM	2.329	1.634, 3.320
Housing status	Clients have housing needs vs. no housing needs	2.181	1.711, 2.780
HIV risk exposure	Other/Unknown risk vs. MSM	2.056	1.368, 3.090
HIV risk exposure	Heterosexual vs. MSM	1.566	1.1.65, 2.106
Mental health	Reported mental illness vs. no reported mental illness	1.430	1.074, 1.903
Race	Black vs. all races combined	1.321	1.046, 1.668
Support network	Limited/no support network vs. strong support network	1.276	0.976, 1.667

Clients less than 45 years old, unstable housed clients, clients with non-MSM risk exposure, clients with reported mental health problems, black clients, and clients with limited/no support network were significantly more likely to not be virally unsuppressed during FY2015. Age, IDU risk exposure, housing status, and Other/Unknown risk exposure were the strongest predictors of unsuppressed viral load.

Discussion:

Outcome Measures

Viral Load and CD4 Count

Helping clients achieve and maintain viral suppression, defined as less than or equal to 200 copies/mL, is the primary goal for Part A Services in the Boston EMA. 93% of clients with viral load data were virally suppressed according to their most recent outcome report, indicating a decline in community viral load among Part A clients, and 89% of clients were virally suppressed and possessed a CD4 level greater than 200 cells/mL. Comparing demographics between the optimally health and least healthy clients, black clients, female clients and Hispanic clients were less likely to achieve viral suppression and a healthy CD4 count. Of all exposure categories, MSM were more likely to achieve suppression and a healthy CD4 count, as were all clients over the age of 45.
The most surprising difference was the proportion of females in each comparison group. Further analysis is needed to determine if there are additional factors that are disproportionately affecting women in the EMA.

The significant differences between race, gender and exposure groups have been identified in other cohorts of PLWH and indicates that the Boston EMA faces similar issues around adherence to care and medication compared to other US regions. (Colasanti, Kelly and Pennisi)

Given the high estimate of viral suppression, it is important to establish the likelihood that it is a fluke measurement or not. Some researchers found that cross-sectional estimates of HIV related outcomes may overestimate achievement, compared to a longitudinal look (Colasanti, Kelly and Pennisi). While we cannot make a longitudinal assessment right now, viral suppression data has been collected within the EMA through numerous sources and provides a rough baseline for estimates viral load. In addition to state HIV surveillance data, viral load monitoring has been part of the JSI Clinical Chart Review project since 2007. Patients' records were reviewed to assess values and frequencies of tests broken down for the entire state of MA, on the EMA level, and by clinical site. The average annual sample size for this project has been approximately 1,200 records for patients that received their care at an EMA clinical site. The most recent Clinical Chart Review found that 85% of all clients with at least one medical visit were virally suppressed (JSI). The most recent Annual RSR Report also estimated that 88% of Ryan White clients in Massachusetts were virally suppressed during calendar year 2014.

As the pool of unsuppressed clients shrinks, it will become more and more important to focus on their defining characteristics to help them reach viral suppression. At the same time, providers will need to continue their efforts serving clients who have achieved viral suppression to help them maintain their health. BPHC is working with the Boston EMA Planning Council and Boston University to conduct a needs assessment study that will identify barriers to achieve viral suppression and challenges unique to out of care and aging clients. Services will need to change with client needs, and we anticipate these changing as clients face new challenges associated with living longer lives.

The viral suppression comparison underscores the importance of continuing to receive and allocate Minority AIDS Initiative (MAI) funds to serve black and Hispanic clients. The comparisons also reveal potentially different needs among the MSM and non-MSM populations, since Ryan White MSM clients are generally healthier within the EMA.

Access to Support Network and Mental Health Status

This dataset revealed a positive correlation between a strong support network status and excellent mental health status, suggesting that two may be related to one another. Nearly 54% of all clients indicated current mental health issues. This is twice the amount of mental health issues reported in the general U.S. population. (CDC) Among clients with no/limited support group, 231 (41%) also indicated their mental health status as In Crisis or Poor. In total, 57% of all reported clients indicated strong support network, while 12% indicated limited or no support.

Men reported better mental health than women, and older clients reported better mental health than younger clients. Gender may confound the relationship between age and mental health, however, because the distribution of gender by age was not accounted for.

Access to support networks may be a factor associated with ability to adhere to treatment or medical care, indicators for mental health issues, such as depression or anxiety, or other quality of life, issues. Support network structures can vary from person to person and can range from family members, partners, friends, or other individuals that offer personal support. Limited social support can be due to HIV stigma, social isolation, or lack of disclosure of HIV status due to fear of discrimination (which is related to the impact of stigma among PLWH).

Psychosocial Support (Peer Support) plays a specific role in addressing barriers and challenges associated with lack of support networks. Based on the Boston EMA's Planning Council definition, services are delivered by and intended for PLWH, placing significant value on the personal experiences and unique perspectives of living with HIV/AIDS. Among BPHC funded providers, Peer Support is often funded and delivered in tandem with Medical Case Management services. Additional Minority AIDS Initiative funds have also been allocated to provide Peer Support services.

There is no present data set linking outcomes to service utilization, but from an acuity perspective, it appears that social isolation and mental health issues lead to increased need for assistance. It is correct then that more of the clients displaying needs are enrolled in Part A MCM programs, which will help them navigate their own care.

Mental health status can be difficult to assess by providers that either do not have internal behavioral health departments or do not have access to clinically licensed staff that can evaluate their clients' mental health status. Providers have expressed difficulty in accurately capturing this outcome as there is no standardized tool used across all providers. This likely underestimates the true need for mental health services among Ryan White Part A clients due to this gap in resources and expertise. Since assessing individuals with the most severe need for mental health services is critical, missing data can be problematic as it prevents some PLWH from being identified and appropriately linked to services. For those clients that are scored and are considered to be "In Crisis", it would also be important to know whether providers, particularly those funded for Medical Case Management, are consistently and effectively referring individuals to mental health counseling in a timely fashion.
Despite availability of insurance and third party reimbursement for mental health services, challenges still persist in finding culturally and linguistically competent mental health providers, waiting lists for services, and caps on visits.

HIV Medical Care and Adherence to HIV-Care visits

Overall, 2,186 clients appear to regularly visit a medical care provider in accordance with the HRSA HAB recommendations of every six months. Each bubble in the figure below represents the number of clients who met a certain threshold for last medical care visits. Almost half of the clients were last seen by a medical provider sometime within 7-12 months from their outcome due date, suggesting a frequency of care that differs from HRSA HAB recommendations.

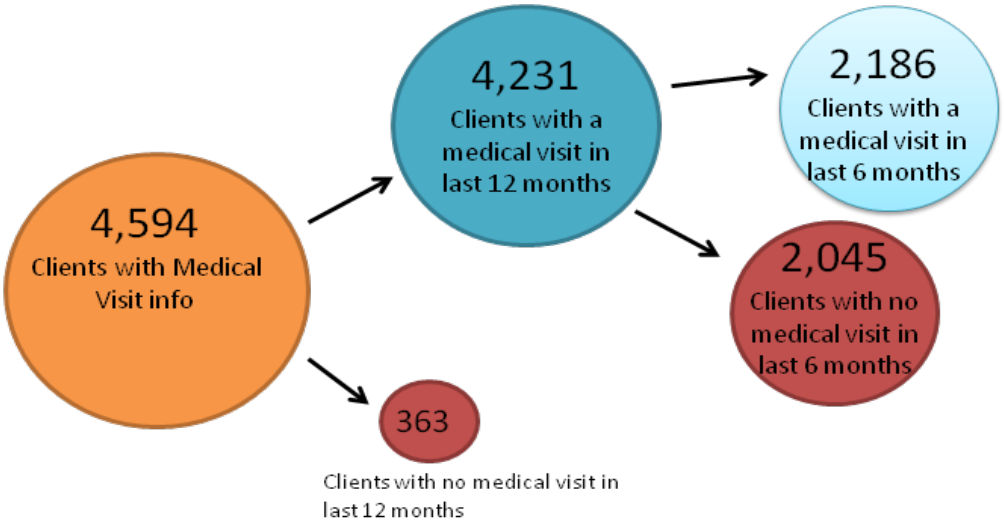


Figure 1: Last Medical Visit Flow Chart

Based on the HAB performance measure, clients are considered to be regularly engaged in medical care if they are seen at least every six months. Clients with a lower acuity for HIV services may not attending their medical appointments as often or regularly as higher acuity clients, suggesting that the rigid six-month period for frequency of medical visits may not be reflective of certain PLWH in the Boston EMA. Based on JSI Clinical Chart Review data, 89% of medical case management patients observed at Part A funded providers were meeting the HAB performance measure of visits every six months.

As clinical practices vary by site and by physician, analysis should be adjusted to account for these differences in order to determine the most appropriate frequency. MDPH surveillance data suggest that MA PLWH were more likely attending their medical visits every eight months. While this does not meet the HAB performance measure requirement, it may suggest that medical visit patterns are more dependent on the individual medical needs of clients that are newly linked to care versus those already in care for a longer time. Data gathered on this outcome in subsequent periods may provide a better perspective on the average frequency of primary care visits, in addition to further analyses with other outcomes, such as viral suppression and/or frequency of attending scheduled HIV visits.

Housing Status

Clients in this report constitute a definite need for housing services in the EMA. 9% of all reported clients are unstably housed, and included in that sub-population are the chronically homeless PLWH. Additionally, 20% of all clients are in need of services covered by Part A, either rental/utility assistance or housing search and advocacy. BPHC funds two housing programs; MCM agencies are also equipped to step into the high level of need as they are able to make key referrals to housing agencies and provide resources for clients with housing issues. BPHC will advise programs to monitor these clients over time to see that they transition to increased stability.

Housing Status had the least amount of missing data as it is a common question conducted during the initial intake process to enroll in services. Housing information is also required because proof of

residence in the jurisdiction is an eligibility criterion for Part A services and enrollment in state Medicaid insurance programs. An e2Boston report indicates that, based on client records, around 12% of clients with submitted outcomes were unstably housed between March 1, 2015 and February 29, 2016.

Due to high cost of housing and utilities in the Boston EMA, rental and utilities assistance may still be needed by PLWH that are currently housed. Medical Case Management and Housing service categories are specifically tasked with assisting clients in obtaining financial assistance and/or seek out affordable housing options. Housing services funded by BPHC were accessed by over 500 unique clients during FY 2015. While a majority of clients overall reported stable housing, it is important to note that changes in housing status can occur between reporting periods and future analysis of housing status will observe the number and percentage of clients that have long term challenges in maintaining housing or experience chronic homelessness.

Adherence to HIV Medication and Severity of Side Effects

24% of all clients experience some level of side effects from HIV-related medication. Another important difference is the proportion of clients who attended HIV scheduled HIV care visits. This BPHC's first year collecting this measure, so it establishes a baseline with which to compare following years.

Medication adherence support is key activity for several Part A services. Treatment adherence counseling is a component of Medical Case Management, often involving patient education and coaching individuals by watching them taking their medications in person (known as directly observed therapy). This is particularly important for newly diagnosed and treatment naïve individuals that are not accustomed to taking medications on a regular basis. Similarly, medication adherence can be difficult for individual with co-morbid conditions, such as hepatitis, tuberculosis, mental illness, or addiction.

Psychosocial Support (Peer Support) also plays a unique role in helping PLWH manage medication adherence issues. Peer advocates, who also are PLWH taking their own HIV medications, can offer unique support in sharing experiences, strategies, and useful tips that enable clients to more effectively adhere to their medications. Peer Support services may be most applicable to 20% of all clients who need a moderate level of assistance with missing one or two doses of medication per week. Peer advocates may also be embedded in multidisciplinary teams along with case managers and nurses that target clients with reported non-adherence. Understanding these factors and developing solutions will be critical steps to improving other outcomes, such as viral suppression and care adherence.

When a client indicates experiencing severe/intolerable or moderate levels of side effects (In Crisis or Poor measures), one additional question is asked by providers to assess how much the client's daily life activities are affected by the side effects. This data is also available upon request.

Factors associated with unsuppressed viral load

Demographic, behavioral, and socioeconomic factors are associated with HIV-related health outcome disparities. (Beer, Mattson and Bradley) In FY2015, half of all Part A clients were persons of color (POC), which includes black, Hispanic and Asian PLWH. POC were significantly more likely not to be virally suppressed. Despite Part A funds providers who target minority populations (Minority AIDS Initiative funds), inequalities in viral suppression rates persist. Within the Boston EMA, and across the nation, young POC also make up a large proportion of newly diagnosed cases. (Control; Services; Health) Future work should examine the relationship

between age and race within the Boston EMA, because Age (<45 years old) was the strongest indicator for unsuppressed viral load among Part A clients in FY2015. Previous research indicates that those over age 40 are likely to begin treatment more quickly than those diagnosed at a younger age. (Novak, Hart and Chmiel) Younger PLWH have also been shown to achieve viral suppression after diagnosis more slowly. Additional information about young POC who are not suppressed is needed to identify current barriers to viral suppression.

In the Boston EMA, clients with MSM risk exposure are the most likely to be virally suppressed. Other risk exposures, such as heterosexual, IDU or persons classified as Other (Perinatal, blood products) and Unknown were more likely to have an unsuppressed viral load. Active substance abuse disorder is a known barrier to care and viral suppression among those with IDU use.
Unsuppressed individuals were more likely to have unmet housing needs, which is consistent with findings from others. (Milloy, Marshall and Montaner) 52% of unsuppressed PLWH receiving Part A funded services reported needing housing related services or financial assistance. Boston has a very high cost of living, which poses significant challenges for low income individuals.

The CDC identifies mental health as "an important part of staying health when living with HIV." (CDC) 72% of unsuppressed clients in this analysis reported mental health problems, compared to 54% of suppressed clients. There is limited capacity for mental health services in the EMA, and an even greater shortage of appropriate mental health providers who want to work with substance abusing or other populations.

This analysis is subject to several limitations. Ryan White clients with incomplete outcome records were excluded from the analysis (n=431). Part A clients are also not representative of all PLWH, and the findings are primarily applicable to this population. This analysis did not include factors such as education, income as a percentage of the federal poverty level, or Part A specific service utilization. Education and poverty, in particular, are proven determinants of HIV health outcomes. (Beer, Mattson and Bradley)

Additional Considerations

Cumulatively, the clients that contributed to this report represent approximately 92% of all clients that received services during FY2015. This is nearly a complete sample of those clients, and is thus representative of all clients who received services during FY2015. A further side by side comparison is found in the Appendix. It is important to note that the 10% of clients not included could due to either they never had a report filed or their outcome report due date is in July or August 2016, which is after the timeframe of this data.

BPHC's recent round of re-procurement brought all existing peer support programs back to the table, including one new program. These results may provide more leverage to add additional funds into peer support in the future. It also provides justification for additional analysis of the relationship between mental health, person support networks, and physical health.

Number of Missing Variables per Outcome Category	Total % Missing
Viral Load	5%
CD4	5%
Support Network	8%
Mental Health	7%
Housing Status	4%
Last Medical Visit	9%
Care Adherence	11%
Severity of Side Effects	11%
Medication Adherence	7%
MCM Status	17%

All analysis was adjusted for missing data, and the proportion of data missing for each outcome indicator varied.

Recommendations and Next Steps

Based on these results, there are several relationships that warrant further study. First, BPHC staff should examine the role that psychosocial support – peer support services play in overall client health (most frequently measured by viral suppression). One a related note, more data should be examined to look at the association between support networks and mental health.

Future updates to e2Boston will improve provider's abilities to submit outcome reports on time, as the current version makes it difficult to track individual client due dates. Across the entire system, outcome report submission was 83% and once the changes are implemented, BPHC will work with providers to increase submission to 90%, and eventually 100%.

In addition to increasing overall reporting, providers will also be encouraged to improve submission of certain data elements, such as viral suppression, where approximately 5% of all reports submitted were missing data on client viral load. The only way to accurately track viral suppression, and any outcome, is with accurate data.

In order to maximize the impact on clients, providers need to engage with client outcomes on an individual level. One of the best ways to identify clients that need additional support or services is by monitoring those who are reported as In Crisis or Poor. There are several practical ways to leverage outcomes data to facilitate change for clients. Providers use outcome reports to target future services based on In Crisis/Poor indicators, particularly MCM programs
Use outcomes for Individual Service Plans (ISP).

Continuous data in the next few years will shed more light how longevity of services impacts health outcomes. Next year's report will feature additional analysis around clients continuing in Ryan White Part A services compared to clients that are either new to Ryan White Part A or only intermittently access services. April, 2017 will mark two full years of collecting outcomes in e2Boston and if data continues to be submitted as it is at the time of publishing, the continuous client cohort should be large. The intention of monitoring clients who are regularly engaged in Ryan White services over time is to look for changes in outcome scores and potentially care patterns.

Supplemental reports could include sorting clients according to service utilization, as well as a breakdown of outcomes associated with viral suppression. The increased level of diversity among PLWH in the Boston EMA, relative to the rest of the population, warrants a more in depth look at how outcomes are related to race/ethnicity, specifically: White, Black, Hispanic (most predominant in EMA).

BPHC, in conjunction with the Boston EMA Planning Council, will use this report and data to inform decisions about service category funding in the EMA. As the grant recipient, it is BPHC's duty to oversee the Part A service system on a macro level

Appendix: Gathering Outcomes Information

Viral Load & CD4 Count

Definition of Outcomes: Viral load score from laboratory test and date of most recent viral load test. CD4 cell count is an additional laboratory based outcome measure that is used to monitor a client's immune system response to an HIV infection. Providers record the actual lab score value and date of test in e2Boston. A CD4 cell count of less than 200 is one of the markers that an HIV infection has progressed to AIDS.

How is the outcome information collected by the provider and how is it presented in this report? Under the HAB performance measure, viral load monitoring should occur at least every six months. In e2Boston, viral load data is reported as the actual lab value with the date on which that lab was completed.

Providers obtain the client's viral load and/or CD4 count information from a medical record, if the site provides primary care services. Otherwise, the provider asks the client if they know their viral load and/or CD4 count, preferably with backup documentation, such as a lab report. All providers enter a numeric value into e2Boston for viral load and CD4 count. Viral load values range from 0 to 1,000,000 or they select "Undetectable" if the laboratory result was too low to count.

In this report, viral load is analyzed in two categories: virally suppressed ($\leq$200copies/mL) or not virally suppressed (>200 copies/mL). CD4 count is divided between $\geq$200 or <200 CD4 cells.

Mental Health Status

Definition of Outcome: Assesses the client's need, or lack thereof, for psychiatric and/or emotional support.

How is the outcome information collected by the provider and how is it presented in this report? Mental Health Status is one of the only indicators in the outcome report that asks the provider to assess the state of a client and is largely based on how the client is perceived, as well as some objective observations, such as enrollment or referral to mental health counseling. BPHC does not directly fund Mental Health services in the Boston EMA and providers may rely on information from other internal behavioral health departments or external providers to assess a client's mental health status.

If the provider selects In "Crisis" or "Poor", e2Boston will also ask whether the provider is aware if the client is currently receiving mental health services. If the client is indicated as not receiving mental health services, the system will then ask if the client has been referred to mental health services. An "Unknown" option is available for both questions if the provider does not have that information while completing the outcome.

Housing Status

Definition of Outcome: Assesses the stability and affordability of a client's living situation.

How is the outcome information collected by the provider and how is it presented in this report? Housing Status is assessed on a four point scale ranging from unstable housing/homelessness to stable housing. Housing information is related to one of the Ryan White eligibility criteria and is collected by all providers at least annually. This information is tracked as part of demographic reports, but is updated in each client's record as housing status changes. Options for Housing Status in the demographic section

include a wide selection: Permanent Housing; Transition Housing; Emergency Shelter; Substance Abuse Treatment Facility; Psychiatric Facility; Incarcerated; Temporarily living or staying in a family member's or friend's room, apartment, or house; and Place not meant for human habitation (e.g. outside, vehicle, etc.).

Housing status tracked as part of outcomes provides a snapshot in time regarding the current housing status and can show whether a client has experienced any changes through multiple outcome reports over time.

Access to Support Network

Definition of Outcome: A support network may include friends, family, religious groups, or other peer groups from with the client obtains emotional, social, spiritual, or material support.

How is the outcome information collected by the provider and how is it presented in this report? Support network information is classified as one of four options, ranging from most severe to not an issue. Clients are asked to report their own level of support networks; if the client cannot be contacted, the provider may leave the question blank or fill in the best option based on their knowledge of the client.

Date of most recent visit with HIV Medical Provider

Definition of Outcome: Assesses whether or not the client received HIV-medical care within the last six months prior to the outcomes report.

How is the outcome information collected by the provider and how is it presented in this report? The provider reports the date of the client's most recent visit with an HIV medical provider. This information is gathered from the client's medical record, either through an EMR or by contacting the medical provider. Medical case managers that coordinate medical appointments on behalf of their clients may also be tracking this information as part of ongoing service delivery. If the provider was unable to determine the date, it is left blank and is considered as missing data.

This data was categorized in two ways for this report. The first table shows visits within six months and greater than six months, which is based on the HAB performance measure for frequency of HIV medical care. Ideally, clients are seen at least twice per year. Due to the change in capturing outcomes with the Client Clock model, the yearly period for each client can vary. An additional table is also provided to show clients that were reported as not having attended a medical visit for more than a year, which may provide a better perspective on those not consistently accessing HIV medical care.

Adherence to HIV-related Care Visits (Care Adherence)

Definition of Outcome: HIV-related appointments include medical appointments, mental health appointments, peer support, case management, and anything else related to care completion and/or support.

How is the outcome information collected by the provider and how is it presented in this report? Adherence to HIV-related care visits is assessed on a four point scale, ranging from never attending care visits to always attending care visits. This can include scheduled medical and social services appointments. Inability to attend such visits is sometimes tracked by providers as no-show or did-not-keep-appointment rates within the client's record.

Adherence to Prescribed HIV-related medical therapies (Medication Adherence)

Definition of Outcome: Missing even one medication per day constitutes a missed dose, regardless of whether the client is taking a multi-pill or single pill regimen.

How is the outcome information collected by the provider and how is it presented in this report?
Adherence to prescribed HIV-related medical therapies is assessed by providers on a four point scale, ranging from missing four or more doses per week to always taking medication. Providers assess this outcome measure by asking the client how often they missed taking their medication on a weekly basis.

Severity of Side Effects of HIV-Related Medications

Definition of Outcome: Measures the subjective experience of side effects from HIV medication.

How is the outcome information collected by the provider and how is it presented in this report?
Severity of Side Effects is measured on a four point scale, ranging from severe to no reported side effects. Providers assess this outcome by asking the client to describe their level of side effects from HIV-related medication.

Medical Case Management Status
Definition of Outcome: Assesses if the client is active at any medical case management agency, funded by Part A or otherwise.

How is the outcome information collected by the provider and how is it presented in this report?
Medical Case Management Status is assessed by asking clients if they were active at an MCM program. There is an optional text field where the provider can also indicate what agency is serving that client. The client does not need to be receiving MCM services specifically funded by BPHC in order to be counted as "Yes". This allows agencies that may internally provide MCM services through other funding sources to indicate a client's connection to MCM or to add information about other area provider that may be providing the service.
For the purposes of this report, the information was reported as a "Yes" or "No".

The following table breaks down how the outcome measures were categorized for analysis:

	If the client was scored in e2Boston as:	The client was

		categorized in this report as:
Viral Load	• Viral Load value <200 copies/mL	Virally suppressed
	• Viral Load value copies/mL	Virally non-suppressed
Mental Health	• *In Crisis:* Is danger to self or others and needs immediate psychiatric evaluation/assessment	Severe to moderate/mild health issues
	• *Poor:* Needs high level of emotional support or counseling due to acute crises, mental health episodes, or severe stress in relationships • *Fair/Good:* Needs some emotional support or counseling but otherwise functioning	
	• *Excellent:* No indication of mental health problems	No indication of mental health issues
Housing Status	• *In Crisis:* Homeless, recently evicted, or home is uninhabitable • *Poor:* Unstable housing (e.g., facing eviction, housing unsafe, or will need housing placement)	Unstable Housing
	• *Fair/Good:* Housing is stable but may need assistance (e.g., rental or utility assistance) or desires relocation	Stable housing, wants financial assistance
	• *Excellent:* Stable and satisfactory housing	Stable Housing
Access to Support Networks	• *In Crisis:* Has no personal support network • *Poor:* Personal support network is present, but it is limited or unreliable	No or limited support network
	• *Fair/Good:* Has some access to personal support networks, but would like more	Some level of access to support network
	• *Excellent:* Has very strong personal support network(s) that can be consistently relied upon.	Strong access to support network
Care Adherence	• *In Crisis:* Client is completely unable to attend HIV-related appointments • *Poor:* Client is frequently unable to attend HIV-related appointments • *Fair/Good:* Client is sometimes unable to attend HIV-related appointments	Not regularly attending scheduled HIV-care visits
	• *Excellent:* Client is often or almost always able to attend HIV-related appointments	Always attends HIV care visits
Medication Adherence	• *In Crisis:* Rarely adheres to HIV-related medical therapies as prescribed (more than 4 doses missed per week) • *Poor:* Sometimes adheres to HIV-related medical therapies as prescribed (3-4 missed doses per week)	Misses 3 or more doses per week
	• *Fair/Good:* Frequently adheres to HIV-related medical therapies as prescribed (1-2 missed doses per week)	Misses 1-2 doses per week
	• *Excellent:* Always adheres to HIV-related medical therapies as prescribed (0 doses missed per week)	Always takes medication
Severity of Side	• *In Crisis:* Side effects are severe/intolerable • *Poor:* Side effects are moderate	Severe/intolerable to mild side effects

Effects	• *Fair/Good:* Side effects are mild	
	• *Excellent:* No side effects	No side effects

Date of most recent visit with HIV Medical Provider	• Last visit more than 6 months from outcome due date	Not retained in medical care
	• Last visit within 6 months from outcome due date	Retained in medical care

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