SUFFOLK UNIVERSITY

CENTER FOR PUBLIC MANAGEMENT

RYAN WHITE CARE ACT
BOSTON EMA TITLE I PROGRAMS

SERVICE UTILIZATION REPORT

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INTRODUCTION

In the treatment of people living with HIV/AIDS, service providers and program funders have long been interested in learning what services, mix of services and amount of services lead to improved outcomes. With improved knowledge about the services that produce the best outcomes, funders and providers could more effectively and efficiently develop services for their target populations.

STUDY GOAL

Since 1996, the Boston Public Health Commission (BPHC), with Suffolk University's Center for Public Management (CPM), has collected health and quality of life outcome data for consumers of Ryan White Title I funded services. In addition, BPHC has also collected data on utilization of these services by all consumers in the Boston EMA. While CPM reports on descriptive data regarding these outcomes on an annual basis, this report is its first attempt at examining the relationship between utilization of Ryan White CARE Act Title I funded services and the health and quality of life of a cohort of people living with HIV/AIDS (PLWH) in the Boston EMA. This report attempts to answer the following questions:

1. Does type of service received impact change in health and quality of life outcomes for clients in the Boston EMA?
2. Does type of service received impact change in health and quality of life outcomes among clients in select demographic groups in the Boston EMA?
3. Which service combinations are more likely to impact change in health and quality of life outcomes?
4. Does the number of service units received impact change in health and quality of life outcomes for clients in the Boston EMA?

REPORT ORGANIZATION

The report is divided into two sections. Part I is a general overview of the findings, while Part II presents greater details on the study methodology, findings and recommendations for future study.

PART I.
SYSTEM IMPLICATIONS

General Findings

The purpose of the study is to examine the relationship between utilization of services and the change in health and quality of life of a cohort of people living with HIV/AIDS (PLWH) in the Boston EMA. To this end, we summarize our findings:

1. *Does type of service received (support services vs. medical only) impact change in health and quality of life outcomes (declined vs. stable/improved) for clients in the cohort?*

   Findings suggest that clients receiving support services have better health outcomes than those receiving medical services only.

   - Results demonstrate that clients receiving support services are 1.5 times more likely to have stable/improved health outcomes than those receiving medical services only.

   However, change in quality of life outcome scores was not impacted differently by having received medical services only versus having received support services.

2. *Does type of service received (support services vs. medical only) impact change in health and quality of life outcomes (declined vs. stable/improved) for select demographic groups in the cohort?*

   Findings suggest that there are few differences in the relationship between service utilization and change in outcome scores (FY02 to FY04) across demographic groups (i.e., gender, race/ethnicity, exposure category).

   - While there is no relationship between service type and change in health outcomes among men, females receiving support services are 1.5 times more likely to have health outcomes scores that remain stable or improve than females receiving medical services only.

   - While no relationship is found between service utilization and health outcomes among Hispanics or among Whites, Blacks who receive support services are more than 2 times as likely as Blacks who receive medical services only to have health outcome scores that remain stable or improve.

   - Hispanics receiving medical services only are more than 2 times as likely as Hispanics receiving support services to have stable/improved quality of life outcomes.

3. *Which service combinations are more likely to impact change in health and quality of life outcomes (declined vs. stable/improved)?*

<u>Health</u>

Findings suggest that clients receiving a combination of services rather than support only, medical only or case management only are more likely to have stable/improved health outcomes.

- For clients receiving medical services, results demonstrate that clients are more likely to have stable/improved health outcome scores if they also receive 1) case management services or 2) case management and support services.

- Results show that clients receiving support services are more likely to have stable/improved health outcome scores if they also receive case management and/or medical services.

- Findings show that clients receiving case management and support are more likely to have stable/improved health outcomes than clients receiving case management only.

<u>Quality of Life</u>

Findings suggest that clients receiving a combination of services rather than support only or medical only are more likely to have stable/improved quality of life outcomes.

- For clients receiving medical services, results show that clients are more likely to have stable/improved quality of life outcome scores if they also receive 1) case management services or 2) case management and support services.

- For clients receiving support services, results suggest that they are more likely to have stable/improved quality of life outcome scores if they also receive 1) case management services or 2) case management and medical services.

Those receiving case management services only have similar change of quality of life outcome scores as those receiving case management plus services in other categories.

4. *Does the number of service units received (high vs. low utilization) impact change in health and quality of life outcomes (declined vs. stable/improved) for clients in the cohort?*

Findings demonstrate few relationships between service utilization level and change in either health or quality of life outcome scores.

- Clients with high utilization of food services are more likely to have stable/improved health outcomes than clients with low utilization of food services.

- Clients with high utilization of mental health services are more likely to have stable/improved quality of life outcomes than clients with low utilization of mental health services.

- Clients with high peer support service utilization are more likely to have stable/improved quality of life outcomes than those with low utilization.

Conclusion

This preliminary look at service utilization within a cohort of the Boston EMA presented several interesting findings.

Overall the analyses (even those that are not statistically significant and not listed in the general findings) suggest that more services, both volume and type, positively impact outcomes. Findings suggest that clients are more likely to have improved health outcomes if they are receiving one or more health-related support services rather than just medical services only. Also, in general, both health and quality of life outcome scores are positively impacted by receipt of a combination of service types rather than one service type alone. Notably, supplementing medical or support services with case management services substantially increases the likelihood (by 400-600%) that clients have stable or improved health outcome scores. Finally, while volume of service units received only appears to impact health and quality of life outcome scores within a few service categories, there is a positive relationship between high utilization and stable/improved outcomes in all service category comparisons.

With the reality of shrinking funds, these findings emphasize the importance of funding a diversity of services for PLWH. It may not be enough to funnel money into medical services alone; instead public funding should be spread across other services as well. In fact, based on these findings, support services not only positively impact quality of life, but, more notably, impact health status as well.

Recommendations for Future Research

Stemming from these findings, future research could potentially focus on identifying the “model” service utilization package. In other words, it would be important to learn about the mix and volume of services that produce the best health and quality of life outcomes for PLWH in the Boston EMA.

Another possibility for future research may be to examine the relationship between type and amount of service utilization among clients that are new to the Title I service system and the subsequent effect on health status and quality of life.

PART II
METHODOLOGY, FINDINGS & DISCUSSION

METHODOLOGY

Data Collection

Outcomes Data[1]

Ryan White Title I grants provide funding for an array of heath and health-related services developed to improve and maintain the health status and quality of life of people living with HIV/AIDS (PLWH) in the Boston EMA. In 1996, Suffolk University's Center for Public Management began working with the Boston Public Health Commission (BPHC) in order to develop an Outcomes Measurement System (OMS) to evaluate the impact of Ryan White Title I services on the health and quality of life of PLWH. Currently, Title I providers are required to report on five of the following outcomes for each consumer every 6 months:

Health Outcomes
1) CD-4 count
2) HIV Viral Loads
3) Knowledge about HIV/AIDS and other support services
4) Ability to access medical care and other support services
5) Ability to maintain medical care
6) Ability to adhere to medical therapies
7) Receipt of medical treatment consistent with US Public Health Service Guidelines[2]

Quality of Life Outcomes

1) Ability to advocate and act on their own behalf and in their best interest
2) Ability to maintain housing
3) Level of support network/level of isolation
4) Coping skills and level of stress
5) Level of depression
6) Level of crisis intervention services utilized
7) Level of side effects from medication
8) Level of criminal behavior

These outcomes are listed and their four levels (crisis, high need, moderate/low need, no need) are defined on a standardized measurement tool. In addition, to ensure confidentiality and at the same time to track clients over time, clients are identified on the Outcomes Measurement Report using a unique identifier.

In 2004, analysts integrated the BPHC demographic database into OMS, allowing more detailed analysis of Title I service impacts.

[1] For a more detailed description of the background on and reliability of the Outcomes Measurement System, please refer to previous reports (i.e. Annual Outcomes Report FY04).
[2] This outcome is not included in the analysis since it is measured on a 2-point rather than 4-point scale.

Client Utilization Data

Client utilization reports are used to collect and review activity within each Title I funded program. Providers report on utilization data to the BPHC quarterly for programs with cost reimbursement budgets and monthly for programs with unit rate budgets. For every client, providers are required to report on service utilization, including service delivered (based on standardized service codes), date of service and number of units delivered (units are defined differently for various services). As with the outcome reports, providers must include each client's unique identifier in order that BPHC can monitor programs and track clients over time.

Data Set

Three databases were used for analysis. From the first, outcome reports for three fiscal years (FY02 – FY04) were counted and unduplicated (see Table 1 for summary of data).

Table 1. Summary of Outcomes Data (FY02-FY04)

Fiscal Year	Reporting Period	Number of Outcome Reports	Number of Unduplicated Clients	Number of Providers
FY02	March 2002 – Feb 2003	15,204	7,680	68
FY03	March 2003 – Feb 2004	14,440	5,969	65
FY04	March 2004 – Feb 2005	17,070	6,414	62

The second database, the Service Utilization Database, contains 127,101 records for analysis, of which 73,087 are for FY03 and 54,014 are for FY04. The last database, containing demographics, includes gender, race/ethnicity and exposure category information on clients. All three databases were merged into a single database. This combined data is limited to a cohort of individuals whose providers consistently report outcome measurements (at least once in each fiscal year) over this three-year period (from March 2002 – February 2005). Ultimately, 2,578 unduplicated cases are included in the analysis.

Definition of Variables

Service Utilization Variables

Ryan White Title I services are categorized into 11 service categories: case management, client advocacy, dental, drug reimbursement, food and meals, housing, mental health, peer support, primary medical care, substance abuse and transportation. In order to measure the impact of service utilization on health and quality of life outcomes, we define service utilization in a variety of ways.

Support Services vs. Medical Only

First, the dataset contains clients who received medical services only and those who received support services (which may include case management) either alone or in combination with medical services at any time during the two year period. In this case, the medical services group is defined as having received one or more of the following types of services: primary medical care, mental health, substance abuse, dental and/or drug reimbursement. These are the core medical services as defined by the Health Resources and Service Administration (HRSA). Those who received one or more of the remaining service types (case management, client advocacy, food and meals, housing, peer support, and/or transportation), either alone or in combination with medical services, are classified as being in the support services group. These categories are defined as such in order to determine whether receipt of support services increases the clients' chances of being stable or improving in health or quality of life status over time.

Service Combinations vs. Single Service

In order to examine the impact of various combinations of services on change in health and quality of life outcomes, service utilization data is classified into three broad categories—support, case management and medical – based on whether a client received services that fall into these categories at any time during the two year period. The case management category includes case management services only. The support category includes client advocacy, food services/meals, peer support, housing and transportation. As in the previous grouping, the medical category includes dental, drug reimbursement, primary care, mental health and substance abuse. In order to determine the best mix of services, clients are assigned to seven specific groups based on their use of case management, support and/or medical services. The seven groups are: medical only; case management only; support only; medical and case management; medical and support; case management and support; and case management, medical and support. Clients who receive more than one type of service are compared to those who receive only one. (Table 2)

Table 2. Service Utilization Combinations

Service Utilization Variable #1	Service Utilization Variable #2
Case Management Only	Case Management & Medical
Case Management Only	Case Management & Support
Case Management Only	All (Case Management, Medical & Support)
Medical Only	Medical & Case Management
Medical Only	Medical & Support
Medical Only	All (Case Management, Medical & Support)
Support Only	Support & Case Management
Support Only	Support & Medical
Support Only	All (Case Management, Medical & Support)

Level of Service Utilization

Finally, to determine whether volume of units received impacts health and quality of life outcomes over time, we first calculate the median number of service units within each of the 11 service types.[3] Within each service type, high utilization is defined as having received greater than or equal to the median

[3] The data distribution shows the mean scores to be heavily skewed by extremely high values (outliers) and thus it is inappropriate for the means to be used to compare amounts of service utilization. In place of the mean the median is reported. The median is the middle value of the data set. Unlike the mean, the median is less affected by outliers.

amount of service units over the two year period (FY03 and FY04). In the same way, low utilization is defined as having received less than the median amount of service during this period. Because the volume of units of service are driven, in part, by funding and also because they are a function of their own definitions, we conclude that a comparison of volume across service type is not appropriate. Defining high and low utilization as the median within the service category creates a standardized way to examine each service type.

Change in Health and Quality of Life Outcome Variables

A health outcome score and a quality of life outcome score is calculated separately for each client. First, for each outcome, a number is assigned based on the measurement level chosen (crisis=9, no need=0). For each client, the numbers received for the outcomes are averaged to obtain two mean scores (one for health and another for quality of life).[4] These scores are calculated for outcomes reported in FY02 and in FY04. Change in outcome scores from FY02 to FY04 is measured by categorizing the difference in aggregate scores at the end of each fiscal year into two categories: stable/improved and declined. A difference in scores of equal to or greater than zero indicates that a client's health/quality of life status is stable/improved from FY02 to FY04. A negative difference indicates that a client's health/quality of life status has declined from FY02 to FY04.

Demographic Variables

Demographic variables included in this analysis are gender, race/ethnicity (Hispanic, Non-Hispanic White, Non-Hispanic Black), and exposure category (MSM, IDU, MSM/IDU, heterosexual contact).

[4] If a client received an outcomes assessment from more than one provider, the assessments were averaged to produce one score.

Statistical Methods

Using the Statistical Program for the Social Sciences (SPSS), the cross-tabulations procedure is employed to examine the relationship between two categorical variables (i.e., service utilization and outcomes change).

Pearson's Chi-Square test measures whether there is a relationship between the two variables (in this case, utilization and outcomes change) for each cross-tabulation. For example, if no relationship exists, one would expect that the same (or statistically similar) proportion of people in the medical only group has health outcome scores that stay the same or improve as those in the support services group. However, if a relationship between the variables does exist (i.e. service utilization impacts health outcome scores), the proportions would be different.

Because in practice proportions are almost never exactly the same, the chi-square test produces a p-value, which measures whether the difference is statistically significant. Statistical significance indicates that there is a high probability that a result is not likely to be due to chance alone. Thus, if a difference between the groups is not statistically significant, the chi-square test would produce a p-value of greater than 0.05. On the other hand, if the difference is statistically significant, it would produce a p-value of less than or equal to 0.05, meaning that one can be 95% confident that this relationship is not just due to chance alone (i.e. it is statistically significant).

In conjunction with the chi-square test, an odds ratio (OR) is generated. The OR is a method of numerically describing the difference (as determined by the chi-square test) between the two groups. Using this analysis as an example, the OR is equal to the ratio of the odds that a client who receives support services (comparison group) will have stable/improved health outcomes compared to the odds that a client who receives medical services only (reference group) will have stable/improved health outcomes (odds of the comparison group ÷ odds of the reference group). In other words, it is the likelihood that the comparison group will have a particular outcome (stable/improved health outcomes) as compared to the reference group. The odds of the reference group is set at 1.0, and the comparison group is measured against this. Therefore, an odds ratio of 1.0 implies that the event is equally likely in both groups. An odds ratio of greater than 1.0 implies that the event is more likely in the comparison group, and an odds ratio of less than 1.0 implies that the event is less likely in the comparison group. Again, a p-value is calculated to determine whether this odds ratio is statistically different than 1.0 (i.e. whether a relationship exists).

In this report, statistically significant relationships where $p<0.05$ (95% confident that the relationship is not due to chance alone) are marked with a single asterisk (*) and where $p<0.01$ (99% confident that the relationship is not due to chance alone) with a double asterisk (**).

FINDINGS

Variable Description

Utilization

In the cohort of 2,578 PLWH in the Boston EMA, 10% (n=258) receive medical services only, while the other 90% receive support services. The proportion of people receiving medical services only does not differ substantially across gender, race or exposure category. (Tables 3A-C)

Table 3A. Service Utilization Overall and by Gender

		Overall % (n=2,578)	Male % (n=1,490)	Female % (n=1,063)
Service Utilization	Medical Only	10.0% (258)	10.4% (155)	9.7% (103)
	Support Services	90.0% (2,320)	89.6% (1,335)	90.3% (960)

Table 3B. Service Utilization by Race/Ethnicity

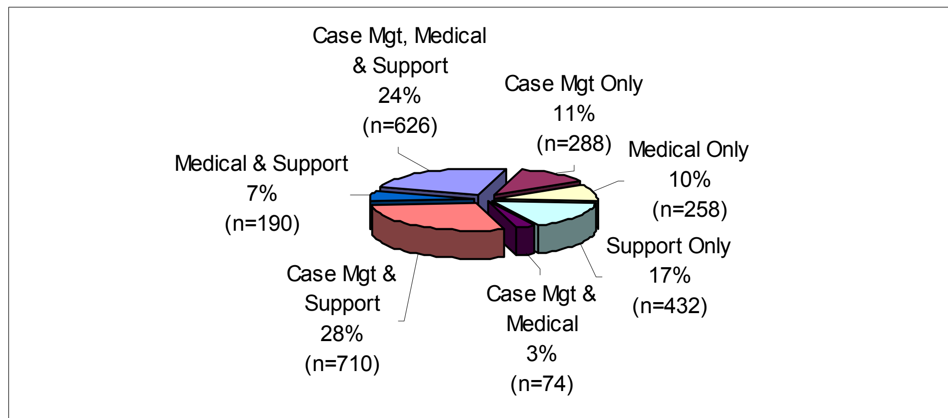
		Hispanic % (n=673)	Black Non Hispanic % (n=893)	White Non Hispanic % (n=635)
Service Utilization	Medical Only	10.4% (70)	8.6% (77)	15.4% (98)
	Support Services	89.6% (603)	91.4% (816)	84.6% (537)

Table 3C. Service Utilization by Exposure Category

		MSM % (n=543)	IDU % (n=782)	MSM/IDU % (n=102)	Hetero % (n=783)
Service Utilization	Medical Only	9.2% (50)	4.5% (35)	7.8% (8)	8.3% (65)
	Support Services	90.8% (493)	95.5% (747)	92.2% (94)	91.7% (718)

With regards to the combination of services, approximately one-fourth (24%) of clients consume services in all three categories—case management, medical and support. Over a quarter of clients (28%) utilizes case management and support services, with only 7% receiving medical and support services and 3% receiving case management and medical services. Finally, about 40% receive only one kind of service—11% case management, 10% medical and 17% support. (Figure 1)

Figure 1. Percentage of Service Utilization by Service Grouping (n=2,578)



As previously stated, high and low utilization is defined by the median amount of units received within service categories over the two year period. The number of units used to define high and low utilization is different across service categories. (Table 4)

Table 4. Definition of Low and High Service Utilization

Service	n	Median Amount of Service Utilization	Low Utilization	High Utilization
Case Management	1,469	6 units	less than 6 units	6 units or higher
Advocacy	631	3 units	less than 3 units	3 units or higher
Dental	284	3 units	less than 3 units	3 units or higher
Drug Reimbursement	126	40 units	less than 40 units	40 units or higher
Food	1,189	79 units	less than 79 units	79 units or higher
Housing	586	3 units	less than 3 units	3 units or higher
Mental Health	428	9 units	less than 9 units	9 units or higher
Peer Support	139	14 units	less than 14 units	14 units or higher
Primary Medical Care	235	4 units	less than 4 units	4 units or higher
Substance Abuse	197	26 units	less than 26 units	26 units or higher
Transportation	846	11 units	less than 11 units	11 units or higher

Outcome Scores

With regards to health outcome scores, 57.5% of those included in the analysis are stable or improved. This proportion does not differ substantially across gender, race or exposure category. The proportion of those who have stable or improved quality of life outcome scores is higher (65.1%). While this rate does not differ across gender, Hispanics are more likely to have stable/improved quality of life outcomes than Black, non-Hispanics and White, non-Hispanics. Finally, those who are exposed through heterosexual contact are more likely to have stable or improved quality of life outcome scores than those who are exposed via other transmission routes. (Tables 5A-5C)

Table 5A. Change in Health and Quality of Life Outcome Scores Overall and by Gender

		Overall % (n=2,578)	Male % (n=1,490)	Female % (n=1,063)
Health Status	Stable/Improved	57.5% (1,482)	56.4% (840)	58.7% (624)
	Decline	42.5% (1,096)	43.6% (650)	41.3% (439
Quality of Life Status	Stable/Improved	65.1% (1,678)	64.5% (961)	65.8% (699)
	Decline	34.9% (900)	35.5% (529)	34.2% (364)

Table 5B. Change in Health and Quality of Life Outcome Scores by Race/Ethnicity

		Hispanic % (n=673)	Black Non Hispanic % (n=893)	White Non Hispanic % (n=635)
Health Status	Stable/Improved	57.4% (386)	57.9% (517)	52.6% (334)
	Decline	42.6% (287)	42.1% (376)	47.4% (301)
Quality of Life Status	Stable/Improved	71.0% (478)	63.2% (564)	62.2% (395)
	Decline	29.0% (195)	36.8% (329)	37.8% (240)

Table 5C. Change in Health and Quality of Life Outcome Scores by Exposure Category

		MSM % (n=543)	IDU % (n=782)	MSM/IDU % (n=102)	Hetero % (n=783)
Health Status	Stable/Improved	56.7% (308)	53.2% (416)	66.7% (68)	60.3% (472)
	Decline	43.3% (235)	46.8% (366)	33.3% (34)	39.7% (311)
Quality of Life Status	Stable/Improved	62.1% (337)	63.6% (497)	56.9% (58)	70.6% (553)
	Decline	37.9% (206)	36.4% (285)	43.1% (44)	29.4% (230)

Support Services vs. Medical Only and Change in Outcome Scores

1. *Does type of service received (support services vs. medical only) impact change in health and quality of life outcomes (declined vs. stable/improved) for clients in the cohort?*

The medical services only group is defined as having received one or more of the following services at any time during the two year period: primary medical care, mental health, substance abuse, dental and/or drug reimbursement. Those who received one or more of the remaining service types (case management, client advocacy, food and meals, housing, peer support, and/or transportation), either alone or in combination with medical services, are classified as being in the support services group.

Findings suggest that clients receiving support services have better health outcomes than those receiving medical services only. Results demonstrate that clients receiving support services are 1.5 times more likely to have stable/improved health outcomes than those receiving medical services only ($p < .01$).[5] (Table 6)

Table 6. Service Utilization by Change in Health Outcome Score, Overall

	Service Utilization	
	Medical Only % (n=258)	Support Services % (n=2,320)
Health Outcome Score		
Stable/Improved	49.2% (127)	58.4% (1355)
Declined	50.8% (131)	41.6% (965)

However, change in quality of life outcome scores was not impacted differently by having received medical services only versus having received support services.

Outcome Differentiation by Demographic Groups

2. *Does type of service received (support services vs. medical only) impact change in health and quality of life outcomes (declined vs. stable/improved) for select demographic groups in the cohort?*

When evaluating the relationship between service utilization and change in outcome scores (FY02 to FY04) across demographic groups (i.e., gender, race/ethnicity, exposure category), few differences are realized. While there is no significant relationship between service type and change in health outcomes among men, females receiving support services are 1.5 times more likely to have health outcomes scores that remain stable or improve than females receiving medical services only. (Table 7)

Table 7. Service Utilization by Change in Health Outcome Score, by Gender

	Male		Female	
	Service Utilization		Service Utilization	
	Medical Only % (n=155)	Support Services % (n=1,335)	Medical Only % (n=103)	Support Services % (n=960)
Health Outcome Score				
Stable/Improved	49.0% (76)	57.2% (764)	49.5% (51)	59.7% (573)
Declined	51.0% (79)	42.8% (571)	50.5% (52)	40.3% (387)

[5] While odds ratios (OR) are reported in the text, the tables present the percentages in each group. The OR is simply a method of numerically describing the difference in the percentages of the two groups being compared.

No significant relationship is found between service utilization and health outcomes among Hispanics or among Whites; Blacks who receive support services are more than 2 times as likely as Blacks who receive medical services only to have health outcome scores that remain stable or improve. In other words, results show that support services may make a bigger impact on health outcomes for Blacks than for Hispanics and Whites. (Table 8)

Table 8. Service Utilization by Change in Health Outcome Score, by Race/Ethnicity

	Hispanic		Black, non-Hispanic		White, non-Hispanic	
	Service Utilization		Service Utilization		Service Utilization	
	Medical Only % (n=70)	Support Services % (n=603)	Medical Only % (n=77)	Support Services % (n=816)	Medical Only % (n=98)	Support Services % (n=537)
Health Outcome Score						
Stable/Improved	52.9% (37)	57.9% (349)	41.6% (32)	59.4% (485)	49.0% (48)	53.3% (286)
Declined	47.1% (33)	42.1% (254)	58.4% (45)	40.6% (331)	51.0% (50)	46.7% (251)

With one exception, findings suggest that within demographic groups there is no significant difference in the impact of service utilization on the change in quality of life outcome scores. Results found that Hispanics receiving medical services only are more than 2 times as likely to have stable/improved quality of life outcomes as compared to Hispanics who received support services ($p < .01$). (Table 9)

Table 9. Service Utilization by Change in Quality of Life Outcome Score, by Race/Ethnicity

	Hispanic		Black, non-Hispanic		White, non-Hispanic	
	Service Utilization		Service Utilization		Service Utilization	
	Medical Only % (n=70)	Support Services % (n=603)	Medical Only % (n=77)	Support Services % (n=816)	Medical Only % (n=98)	Support Services % (n=537)
QOL Outcome Score						
Stable/Improved	84.3% (59)	69.5% (419)	53.2% (41)	64.1% (523)	60.2% (59)	62.6% (336)
Declined	15.7% (11)	30.5% (184)	46.8% (36)	35.9% (293)	39.8% (39)	37.4% (201)

Several demographic groups are too small to draw any major conclusions, although the results may be statistically significant. For example, while a statistically significant relationship between service utilization and health outcomes exists in the MSM/IDU exposure group, there are too few people (n=8) in the medical only group to draw a reliable conclusion.

Service Combinations vs. Single Service and Change in Outcome Scores

3. *Which service combinations are more likely to impact change in health and quality of life outcomes (declined vs. stable/improved)?*

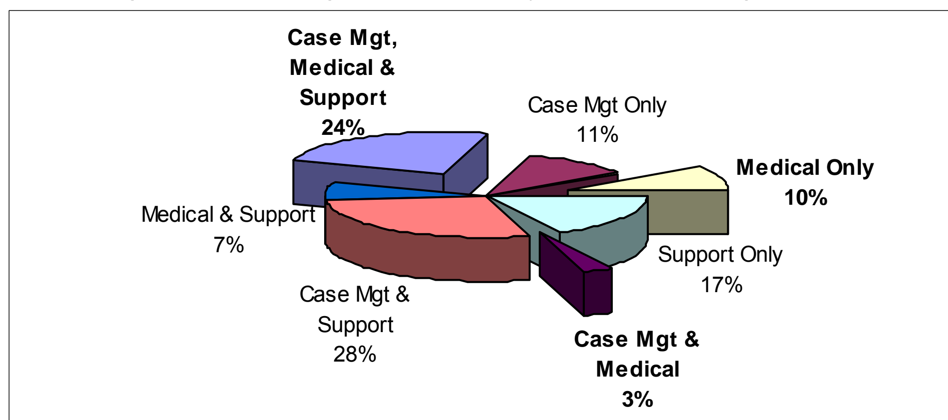
As previously described, in order to examine the impact of various combinations of services on health and quality of life outcomes, utilization data is classified into three broad categories - support, case management and medical – based on whether a client received services that fall into these categories at any time during the two year period. The case management category only includes case management services. The support category includes client advocacy, food services, peer support, housing and transportation. Lastly, the medical category includes dental, drug reimbursement, primary care, mental health and substance abuse. Clients are then assigned to seven specific groups based on their receipt of the services: medical only; case management only; support only; medical and case management; medical and support; case management and support; and case management, medical and support. Clients receiving more than one type of service are compared to those receiving only one.

Health Outcomes

Findings suggest that clients in the cohort receiving a combination of services rather than support only, medical only or case management only are more likely to have stable/improved health outcomes.

For clients receiving medical services, results illustrate that clients are more likely to have stable/improved health outcome scores if they also receive 1) case management services or 2) case management and support services. (The groupings reported on are bolded in Figure 2.)

Figure 2. Percentage of Utilization by Service Grouping - Medical



Clients receiving medical and case management services are nearly 5 times as likely to have stable/improved health outcomes as clients receiving medical services only ($p<0.01$). (Table 10)

Table 10. Service Utilization (Medical Only vs. Medical and Case Management) by Change in Health Outcome Score

	Service Utilization	
	Medical Only % (n=258)	Medical and Case Management % (n=74)
Health Outcome Score		
Stable/Improved	49.2% (127)	82.4% (61)
Declined	50.8% (131)	17.6% (13)

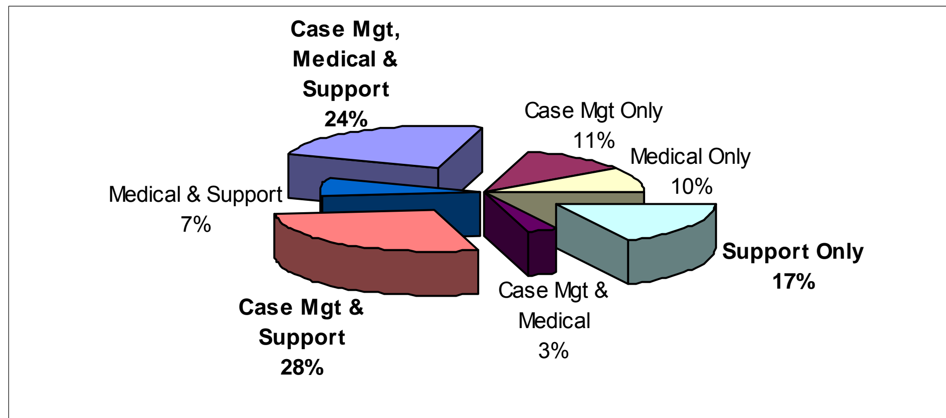
Clients receiving medical, support and case management services are almost 4 times more likely to have stable/improved health outcomes than clients receiving medical services only ($p<0.01$). (Table 11)

Table 11. Service Utilization (Medical Only vs. Medical, Support and Case Management) by Change in Health Outcome Score

	Service Utilization	
	Medical Only % (n=258)	Medical, Support and Case Management % (n=626)
Health Outcome Score		
Stable/Improved	49.2% (127)	78.8% (493)
Declined	50.8% (131)	21.2% (133)

For clients receiving support services, results reveal that clients are more likely to have stable/improved health outcome scores if they also receive case management or case management and medical services. (The groupings reported on are bolded in Figure 3.)

Figure 3. Percentage of Utilization by Service Grouping - Support



Clients receiving support and case management services are almost 7 times more likely to have stable/improved health outcomes than clients receiving support services only ($p<0.01$). (Table 12)

Table 12. Service Utilization (Support Only vs. Support and Case Management) by Change in Health Outcome Score

	Service Utilization	
	Support Only % (n=432)	Support and Case Management % (n=710)
Health Outcome Score		
Stable/Improved	54.9% (237)	89.0% (632)
Declined	45.1% (195)	11.0% (78)

Clients receiving support, medical and case management services are 3 times more likely to have stable/improved health outcomes than clients receiving support services only (p<0.01). (Table 13)

Table 13. Service Utilization (Support Only vs. Support, Medical and Case Management) by Change in Health Outcome Score

	Service Utilization	
	Support Only % (n=432)	Support, Medical and Case Management % (n=626)
Health Outcome Score		
Stable/Improved	54.9% (237)	78.8% (493)
Declined	45.1% (195)	21.2% (133)

Finally, among the case management services comparisons (groupings are bolded in Figure 4), clients receiving case management and support are almost 3 times more likely to have stable/improved health outcomes than clients receiving case management only (p<0.01). (Table 14)

Figure 4. Percentage of Utilization by Service Grouping – Case Management

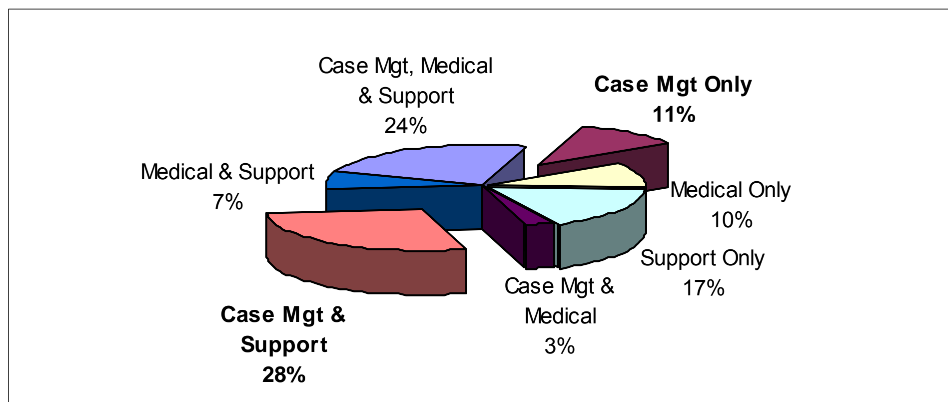


Table 14. Service Utilization (Case Management Only vs. Case Management and Support) by Change in Health Outcome Score

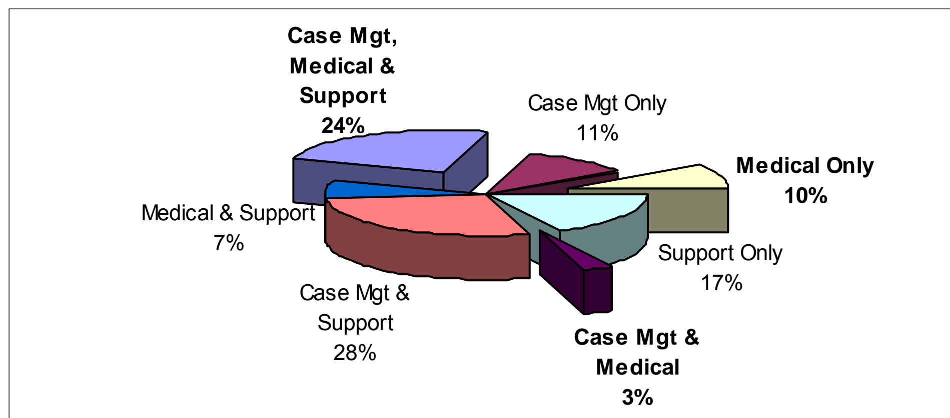
	Service Utilization	
	Case Management Only % (n=288)	Case Management and Support % (n=710)
Health Outcome Score		
Stable/Improved	73.3% (211)	89.0% (632)
Declined	26.7% (77)	11.0% (78)

Quality of Life Outcomes

Findings suggest that clients receiving a combination of services rather than support only or medical only are more likely to have stable/improved quality of life outcomes.

For clients receiving medical services, results demonstrate that clients are more likely to have stable/improved quality of life outcomes scores if they also receive: 1) case management services or 2) case management and support services. (The groupings are bolded in Figure 5 below.)

Figure 5. Percentage of Utilization by Service Grouping - Medical



Clients receiving medical and case management services are more than 3 times as likely to have stable/improved quality of life outcomes as clients receiving medical services only ($p<0.01$). (Table 15)

Table 15. Service Utilization (Medical Only vs. Medical and Case Management) by Change in Quality of Life Outcome Score

	Service Utilization	
	Medical Only % (n=258)	Medical and Case Management % (n=74)
QOL Outcome Score		
Stable/Improved	65.5% (169)	86.5% (64)
Declined	34.5% (89)	13.5% (10)

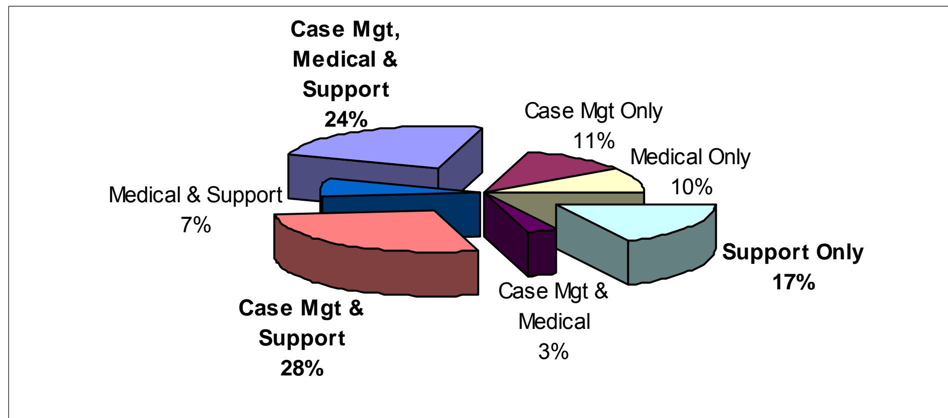
Clients receiving medical, support and case management services are 1.5 times more likely to have stable/improved quality of life outcomes than those receiving medical services only ($p<0.01$). (Table 16)

Table 16. Service Utilization (Medical Only vs. Medical, Support and Case Management) by Change in Quality of Life Outcome Score

	Service Utilization	
	Medical Only % (n=258)	Medical, Support and Case Management % (n=626)
QOL Outcome Score		
Stable/Improved	65.5% (169)	74.3% (465)
Declined	34.5% (89)	25.7% (161)

For clients receiving support services, results reveal that clients are more likely to have stable/improved quality of life scores if they also receive case management or case management and medical support. (The groupings are bolded in Figure 6 below.)

Figure 6. Percentage of Utilization by Service Grouping - Support



Clients receiving support and case management are nearly 2 times more likely to have stable/improved quality of life outcomes than clients receiving support services only ($p<0.01$). (Table 17)

Table 17. Service Utilization (Support Only vs. Support and Case Management) by Change in Health or Quality of Life Outcome Score

	Service Utilization	
	Support Only % (n=432)	Support and Case Management % (n=710)
QOL Outcome Score		
Stable/Improved	61.3% (265)	73.8% (524)
Declined	38.7% (167)	26.2% (186)

Clients receiving support, medical and case management services are 1.8 times more likely to have stable/improved quality of life outcomes than those receiving support services only ($p<0.01$). (Table 18)

Table 18. Service Utilization (Support Only vs. Support, Medical and Case Management) by Change in Quality of Life Outcome Score

	Service Utilization	
	Support Only % (n=432)	Support, Medical and Case Management % (n=626)
QOL Outcome Score		
Stable/Improved	61.3% (265)	74.3% (465)
Declined	38.7% (167)	25.7% (161)

Those receiving case management services only have similar change of quality of life outcome scores to those receiving case management plus services in other categories.

Level of Service Utilization and Change in Outcome Scores

4. Does the number of service units received (high vs. low utilization) impact change in health and quality of life outcomes (declined vs. stable/improved) for clients in the cohort?

Clients' utilization level is determined by the median amount of service units received within each of the 11 service categories. High utilization is defined as having received greater than or equal to the median amount of service units, and low utilization is defined as having received less than the median amount of service units. Within each service category, change in health and quality of life outcome scores for clients who have high utilization is compared to change in scores for those who have low utilization. Relationships were found between utilization level and change in either health or quality of life outcomes scores for three service categories: food services, mental health and peer support. (Table 19 below provides the definition of low and high service utilization for these service categories. For the definition of low and high service utilization for all service categories, see Table 4 on page 12.)

Table 19. Definition of Low and High Service Utilization

Service	n	Median Amount of Service Utilization	Low Utilization	High Utilization
Food	1,189	79 units	less than 79 units	79 units or higher
Mental Health	428	9 units	less than 9 units	9 units or higher
Peer Support	139	14 units	less than 14 units	14 units or higher

Within one service category – food services – results show a relationship between level of utilization and change in health outcome scores. Findings suggest that clients with high utilization of food services (≥79 units) are 1.5 times more likely to have stable/improved health outcomes than clients with low utilization of food services ($p<0.01$). (Table 20)

Table 20. Level of Food Service Utilization by Change in Health Outcome Score

	Food Service Utilization	
	Low % (n=593)	High % (n=596)
Health Outcome Score		
Stable/Improved	70.0% (415)	78.0% (465)
Declined	30.0% (178)	22.0% (131)

Findings also suggest that clients with high utilization of mental health or peer support services are more likely to have stable/improved quality of life outcomes than those with low utilization. Clients with high utilization of mental health services (≥9 units) are almost 2 times more likely to have stable/improved quality of life outcomes than clients with low utilization of mental health services ($p<0.01$). Finally, clients with high peer support service utilization (≥14 units) are more than 2 times as likely to have stable/improved quality of life outcomes as those with low utilization ($p<0.01$). (Table 21)

Table 21. Level of Mental Health and Peer Support Service Utilization by Change in Health or Quality of Life Outcome Score

	Mental Health Service Utilization		Peer Support Service Utilization	
	Low % (n=175)	High % (n=253)	Low % (n=71)	High % (n=70)
QOL Outcome Score				
Stable/Improved	53.7% (94)	66.4% (168)	71.8% (51)	85.7% (60)
Declined	46.3% (81)	33.6% (85)	28.2% (20)	14.3% (10)

DISCUSSION

While this is a preliminary look at service utilization within a cohort of the Boston EMA, there are several interesting findings.

Firstly, analysis suggests that clients are more likely to have improved health outcomes if receiving one or more health-related support services rather than just medical services only. Those in the support services category may be receiving one type of support service or 10 types of services. In any case, support services appear to positively impact the health of PLWH in the Boston EMA.

Exploring the service category combinations in a bit more depth, the importance of receiving a variety of services is highlighted. In general, both health and quality of life outcome scores are positively impacted by receipt of a combination of service types rather than one service type alone (i.e. medical only or support only). Notably, supplementing medical or support services with case management services substantially increases the likelihood (by 400-600%) that clients have stable or improved health outcome scores.

Additionally, while volume of service units received only appears to impact health and quality of life outcome scores within a few service categories, it is important to note that in all 22 comparisons there is a positive relationship between high utilization and stable/improved outcomes.

Overall the analyses (even those that were not statistically significant) suggest that more services, both volume and type, positively impact outcomes.

With the reality of shrinking funds, these findings emphasize the importance of funding a diversity of services for PLWH. It may not be enough to funnel money into medical services alone; instead public funding should be spread across case management and other health-related support services. In fact, based on these findings, support services not only positively impact quality of life, but, notably, impact health status as well.

Limitations

While these findings are valuable, there are limitations to this analysis.

This analysis accounts for only services received through Ryan White Title I funding; it does not take into account services provided by other funding sources. For example, clients may receive medical care through private insurance or Medicaid. Therefore, clients may be misclassified into the wrong group if they receive services elsewhere. However, because we are specifically interested in the impact of Ryan White Title I services, this may not severely impact our interpretation.

Another limitation of this data is that virtually every client represents a unique path when consuming services; this path changes over time as clients improve, decline or remain stable with respect to health status and quality of life.

Also, this analysis is limited to a cohort of people who have consistently been in care. Therefore, these results may not apply to those who do not access care regularly.

Finally, the outcome measurement tool is often completed by providers. Since many of the questions are subjective in nature, there may be some variation in interpretation across providers.
Nonetheless, these findings may provide important insights into the impact of service provision for PLWH.

Recommendations for Future Research

Future reports may want to consider other analyses, such as:

1. Description of the "model" service utilization package (i.e. what mix and volume of services produce the best outcomes).

2. Relationship between type and amount of service utilization among new intakes (clients new to the Title I Service system) over a specific time frame (e.g. two fiscal years) and the subsequent effect on health status and quality of life.

3. Relationships between change in health status and change in quality of life.

4. Relationships among the 24 service unit types (e.g. number of face-to-face case management visits) and their effect on health status and quality of life changes.

5. Relationships between individual health status and quality of life outcome measures (e.g. CD-4 counts) and specific service unit types (e.g. food services).

Appendix:

Tables of Results

This appendix contains tables of all of the analyses done for this report, not only the statistically significant results discussed in the report. These tables are listed in pairs, with the first (a) describing the percentages in each group and the second (b) showing the odds ratio (OR) and 95% confidence interval.

As previously described, the OR is a method of numerically describing the difference between the two groups being compared. The odds of the reference group (e.g. medical services only) is set at 1.0, and the comparison group (e.g. support services) is measured against this. If the odds ratio of the comparison group is greater than 1.0, this implies that the event is more likely to occur in the comparison group, and an odds ratio of less than 1.0 implies that the event is less likely to occur in the comparison group. Below is an example of a table with an interpretation following:

	Stable/Improved Health Outcome Scores	
	OR**	95% CI
Utilization		
Medical only	1.0	
Support Services	1.45	(1.12, 1.87)

**p-value ≤ .01

Interpretation: "Clients who receive support services are 1.45 times more likely than clients who receive medical services only to have stable/improved health outcome scores."

A p-value is calculated to determine whether the OR of the comparison group is statistically different than the OR of the reference group (i.e. whether a relationship exists). In this report, statistically significant relationships where p<0.05 (95% confident that the relationship is not due to chance alone) are marked with a single asterisk (*) and where p<0.01 (99% confident that the relationship is not due to chance alone) with a double asterisk (**).

App. Table 1a. Service utilization by change in health outcome score, overall

	Service Utilization	
	Medical Only % (n=258)	Support Services % (n=2,320)
Health Outcome Score		
Stable/Improved	49.2% (127)	58.4% (1,355)
Declined	50.8% (131)	41.6% (965)

App. Table 1b. Association between receiving support services (vs. medical only) and having stable/improved health outcome scores, overall

	Stable/Improved Health Outcome Scores	
	OR**	95% CI
Utilization		
Medical only	1.0	
Support Services	1.45	(1.12, 1.87)

**p-value ≤ .01

App. Table 2a. Service utilization by change in quality of life outcome score, overall

	Service Utilization	
	Medical Only % (n=258)	Support Services % (n=2,320)
QOL Outcome Score		
Stable/Improved	65.5% (169)	65.0% (1,509)
Declined	34.5% (89)	35.0% (811)

App. Table 2b. Association between receiving support services (vs. medical only) and having stable/improved quality of life outcome scores, overall

	Stable/Improved QOL Outcome Scores	
	OR	95% CI
Utilization		
Medical only	1.0	
Support Services	0.98	(0.75, 1.28)

App. Table 3a. Service utilization by change in health outcome score, by gender

	Male		Female	
	Service Utilization		Service Utilization	
	Medical Only % (n=155)	Support Services % (n=1,335)	Medical Only % (n=103)	Support Services % (n=960)
Health Outcome Score				
Stable/Improved	49.0% (76)	57.2% (764)	49.5% (51)	59.7% (573)
Declined	51.0% (79)	42.8% (571)	50.5% (52)	40.3% (387)

App. Table 3b. Association between receiving support services (vs. medical only) and having stable/improved health outcome scores, by gender

	Stable/Improved Health Outcome Scores			
	Male		Female	
	OR	95% CI	OR*	95% CI
Utilization				
Medical only	1.0		1.0	
Support Services	1.39	(0.997, 1.94)	1.51	(1.01, 2.27)

*p-value ≤ .05

App. Table 4a. Service utilization by change in health outcome score, by race/ethnicity

	Hispanic		Black, non-Hispanic		White, non-Hispanic	
	Service Utilization		Service Utilization		Service Utilization	
	Medical Only % (n=70)	Support Services % (n=603)	Medical Only % (n=77)	Support Services % (n=816)	Medical Only % (n=98)	Support Services % (n=537)
Health Outcome Score						
Stable/Improved	52.9% (37)	57.9% (349)	41.6% (32)	59.4% (485)	49.0% (48)	53.3% (286)
Declined	47.1% (33)	42.1% (254)	58.4% (45)	40.6% (331)	51.0% (50)	46.7% (251)

App. Table 4b. Association between receiving support services (vs. medical only) and having stable/improved health outcome scores, by race/ethnicity

	Stable/Improved Health Outcome Scores					
	Hispanic		Black, Non-Hispanic		White, Non-Hispanic	
	OR	95% CI	OR**	95% CI	OR	95% CI
Utilization						
Medical only	1.0		1.0		1.0	
Support Services	1.23	(0.75, 2.01)	2.06	(1.28, 3.31)	1.19	(0.77, 1.82)

**p-value ≤ .01

App. Table 5a. Service utilization by change in health outcome score, by exposure category

	MSM		IDU		MSM/IDU		Heterosexual Contact	
	Service Utilization		Service Utilization		Service Utilization			
	Medical Only % (n=50)	Support Services % (n=493)	Medical Only % (n=35)	Support Services % (n=747)	Medical Only % (n=8)	Support Services % (n=94)	Medical Only % (n=65)	Support Services % (n=718)
Health Outcome Score								
Stable/Improved	52.0% (26)	57.2% (282)	45.7% (16)	53.5% (400)	12.5% (1)	71.3% (67)	52.3% (34)	61.0% (438)
Declined	48.0% (24)	42.8% (211)	54.3% (19)	46.5% (347)	87.5% (7)	28.7% (27)	47.7% (31)	39.0% (280)

App. Table 5b. Association between receiving support services (vs. medical only) and having stable/improved health outcome scores, by exposure category

	Stable/Improved Health Outcome Scores							
	MSM		IDU		MSM/IDU[a]		Heterosexual	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Utilization								
Medical only	1.0		1.0		1.0		1.0	
Support Services	1.23	(0.69, 2.21)	1.37	(0.69, 2.70)	17.24	(2.04, 142.86)	1.43	(0.86, 2.38)

[a] Too few people to interpret

App. Table 6a. Service utilization by change in quality of life outcome score, by gender

	Male		Female	
	Service Utilization		Service Utilization	
	Medical Only % (n=155)	Support Services % (n=1,335)	Medical Only % (n=103)	Support Services % (n=960)
QOL Outcome Score				
Stable/Improved	65.2% (101)	64.4% (860)	66.0% (68)	65.7% (631)
Declined	34.8% (54)	35.6% (475)	34.0% (35)	34.3% (329)

App. Table 6b. Association between receiving support services (vs. medical only) and having stable/improved quality of life outcome scores, by gender

	Stable/Improved QOL Outcome Scores			
	Male		Female	
	OR	95% CI	OR	95% CI
Utilization				
Medical only	1.0		1.0	
Support Services	0.97	(0.68, 1.37)	0.99	(0.64, 1.52)

App. Table 7a. Service utilization by change in quality of life outcome score, by race/ethnicity

	Hispanic		Black, non-Hispanic		White, non-Hispanic	
	Service Utilization		Service Utilization		Service Utilization	
	Medical Only % (n=70)	Support Services % (n=603)	Medical Only % (n=77)	Support Services % (n=816)	Medical Only % (n=98)	Support Services % (n=537)
QOL Outcome Score						
Stable/Improved	84.3% (59)	69.5% (419)	53.2% (41)	64.1% (523)	60.2% (59)	62.6% (336)
Declined	15.7% (11)	30.5% (184)	46.8% (36)	35.9% (293)	39.8% (39)	37.4% (201)

App. Table 7b. Association between receiving support services (vs. medical only) and having stable/improved quality of life outcome scores, by race/ethnicity

	Stable/Improved QOL Outcome Scores					
	Hispanic		Black, Non-Hispanic		White, Non-Hispanic	
	OR	95% CI	OR	95% CI	OR	95% CI
Utilization						
Medical only	1.0		1.0		1.0	
Support Services	0.42	(0.22, 0.83)	1.57	(0.98, 2.51)	1.10	(0.71, 1.72)

App. Table 8a. Service utilization by change in quality of life outcome score, by exposure category

	MSM		IDU		MSM/IDU		Heterosexual Contact	
	Service Utilization		Service Utilization		Service Utilization			
	Medical Only % (n=50)	Support Services % (n=493)	Medical Only % (n=35)	Support Services % (n=747)	Medical Only % (n=8)	Support Services % (n=94)	Medical Only % (n=65)	Support Services % (n=718)
QOL Outcome Score								
Stable/Improved	74.0% (37)	60.9% (300)	74.3% (26)	63.1% (471)	37.5% (3)	58.5% (55)	75.4% (49)	70.2% (504)
Declined	26.0% (13)	39.1% (193)	25.7% (9)	36.9% (276)	62.5% (5)	41.5% (39)	24.6% (16)	29.8% (214)

App. Table 8b. Association between receiving support services (vs. medical only) and having stable/improved quality of life outcome scores, by exposure category

	Stable/Improved QOL Outcome Scores							
	MSM		IDU		MSM/IDU[a]		Heterosexual	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Utilization								
Medical only	1.0		1.0		1.0		1.0	
Support Services	0.55	(0.28, 1.05)	0.59	(0.27, 1.28)	2.35	(0.53, 10.40)	0.77	(0.43, 1.38)

[a] Too few people to interpret

App. Table 9a. Service utilization (case management only vs. case management and medical) by change in health or quality of life outcome score

	Service Utilization	
	Case Management Only % (n=288)	Case Management and Medical % (n=74)
Health Outcome Score		
Stable/Improved	73.3% (211)	82.4% (61)
Declined	26.7% (77)	17.6% (13)
QOL Outcome Score		
Stable/Improved	78.8% (227)	86.5% (64)
Declined	21.2% (61)	13.5% (10)

App. Table 9b. Association between receiving case management and medical services (vs. receiving case management services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Utilization				
Case Management only	1.0		1.0	
Case Management and Medical	1.71	(0.89, 3.29)	1.72	(0.83, 3.55)

App. Table 10a. Service utilization (case management only vs. case management and support) by change in health or quality of life outcome score

	Service Utilization	
	Case Management Only % (n=288)	Case Management and Support % (n=710)
Health Outcome Score		
Stable/Improved	73.3% (211)	89.0% (632)
Declined	26.7% (77)	11.0% (78)
QOL Outcome Score		
Stable/Improved	78.8% (227)	73.8% (524)
Declined	21.2% (61)	26.2% (186)

App. Table 10b. Association between receiving case management and support services (vs. receiving case management services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR**	95% CI	OR	95% CI
Utilization				
Case Management only	1.0		1.0	
Case Management and Support	2.96	(2.08, 4.20)	0.76	(0.55, 1.05)

**p-value ≤ .01

App. Table 11a. Service utilization (case management only vs. case management, support and medical) by change in health or quality of life outcome score

	Service Utilization	
	Case Management Only % (n=288)	Case Management, Support, and Medical % (n=626)
Health Outcome Score		
Stable/Improved	73.3% (211)	78.8% (493)
Declined	26.7% (77)	21.2% (133)
QOL Outcome Score		
Stable/Improved	78.8% (227)	74.3% (465)
Declined	21.2% (61)	25.7% (161)

App. Table 11b. Association between receiving case management, medical and support services (vs. receiving case management services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Utilization				
Case Management only	1.0		1.0	
Case Management, Medical, and Support	1.35	(0.98, 1.87)	0.77	(0.56, 1.09)

App. Table 12a. Service utilization (medical only vs. medical and case management) by change in health or quality of life outcome score

	Service Utilization	
	Medical Only % (n=258)	Medical and Case Management % (n=74)
Health Outcome Score		
Stable/Improved	49.2% (127)	82.4% (61)
Declined	50.8% (131)	17.6% (13)
QOL Outcome Score		
Stable/Improved	65.5% (169)	86.5% (64)
Declined	34.5% (89)	13.5% (10)

App. Table 12b. Association between receiving medical and case management services (vs. receiving medical services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR**	95% CI	OR**	95% CI
Utilization				
Medical only	1.0		1.0	
Medical and Case Management	4.84	(2.54, 9.24)	3.37	(1.65, 6.88)

**p-value ≤ .01

App. Table 13a. Service utilization (medical only vs. medical and support) by change in health or quality of life outcome score

	Service Utilization	
	Medical Only % (n=258)	Medical and Support % (n=190)
Health Outcome Score		
Stable/Improved	49.2% (127)	46.3% (88)
Declined	50.8% (131)	53.7% (102)
QOL Outcome Score		
Stable/Improved	65.5% (169)	65.8% (125)
Declined	34.5% (89)	34.2% (65)

App. Table 13b. Association between receiving medical and support services (vs. receiving medical services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Utilization				
Medical only	1.0		1.0	
Medical and Support	0.89	(0.61, 1.30)	1.01	(0.68, 1.50)

App. Table 14a. Service utilization (medical only vs. medical, support and case management) by change in health or quality of life outcome score

	Service Utilization	
	Medical Only % (n=258)	Medical, Support and Case Management % (n=626)
Health Outcome Score		
Stable/Improved	49.2% (127)	78.8% (493)
Declined	50.8% (131)	21.2% (133)
QOL Outcome Score		
Stable/Improved	65.5% (169)	74.3% (465)
Declined	34.5% (89)	25.7% (161)

App. Table 14b. Association between receiving medical, case management and support services (vs. receiving medical services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR**	95% CI	OR**	95% CI
Utilization				
Medical only	1.0		1.0	
Medical, Case Management and Support	3.82	(2.80, 5.21)	1.52	(1.11, 2.08)

**p-value ≤ .01

App. Table 15a. Service utilization (support only vs. support and case management) by change in health or quality of life outcome score

	Service Utilization	
	Support Only % (n=432)	Support and Case Management % (n=710)
Health Outcome Score		
Stable/Improved	54.9% (237)	89.0% (632)
Declined	45.1% (195)	11.0% (78)
QOL Outcome Score		
Stable/Improved	61.3% (265)	73.8% (524)
Declined	38.7% (167)	26.2% (186)

App. Table 15b. Association between receiving support and case management services (vs. receiving support services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR**	95% CI	OR**	95% CI
Utilization				
Support only	1.0		1.0	
Support and Case Management	6.67	(4.93, 9.02)	1.78	(1.38, 2.29)

**p-value ≤ .01

App. Table 16a. Service utilization (support only vs. support and medical) by change in health or quality of life outcome score

	Service Utilization	
	Support Only % (n=432)	Support and Medical % (n=190)
Health Outcome Score		
Stable/Improved	54.9% (237)	46.3% (88)
Declined	45.1% (195)	53.7% (102)
QOL Outcome Score		
Stable/Improved	61.3% (265)	65.8% (125)
Declined	38.7% (167)	34.2% (65)

App. Table 16b. Association between receiving support and medical services (vs. receiving support services only) and having stable/improved health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR*	95% CI	OR	95% CI
Utilization				
Support only	1.0		1.0	
Support and Medical	0.71	(0.50, 1.00)	1.21	(0.85, 1.73)

*p-value ≤ .05

App. Table 17a. Service utilization (support only vs. support, medical and case management) by change in health or quality of life outcome score

	Service Utilization	
	Support Only % (n=432)	Support, Medical and Case Management % (n=626)
Health Outcome Score		
Stable/Improved	54.9% (237)	78.8% (493)
Declined	45.1% (195)	21.2% (133)
QOL Outcome Score		
Stable/Improved	61.3% (265)	74.3% (465)
Declined	38.7% (167)	25.7% (161)

App. Table 17b. Association between receiving support, medical and case management services (vs. receiving support services only) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR**	95% CI	OR**	95% CI
Utilization				
Support only	1.0		1.0	
Support, Medical and Case Management	3.05	(2.33, 3.99)	1.82	(1.40, 2.37)

**p-value ≤ .01

App. Table 18a. Level of *case management* service utilization by change in health or quality of life outcome score

	Case Management Service Utilization	
	Low % (n=745)	High % (n=724)
Health Outcome Score		
Stable/Improved	76.1% (567)	77.1% (558)
Declined	23.9% (178)	22.9% (166)
QOL Outcome Score		
Stable/Improved	71.3% (531)	73.9% (535)
Declined	28.7% (214)	26.1% (189)

App. Table 18b. Association between receiving high level of *case management* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Case Management Utilization				
Low	1.0		1.0	
High	1.06	(0.83, 1.34)	1.14	(0.91, 1.44)

App. Table 19a. Level of *client advocacy* service utilization by change in health or quality of life outcome score

	Client Advocacy Service Utilization	
	Low % (n=267)	High % (n=364)
Health Outcome Score		
Stable/Improved	80.1% (214)	79.1% (288)
Declined	19.9% (53)	20.9% (76)
QOL Outcome Score		
Stable/Improved	65.9% (176)	69.2% (252)
Declined	34.1% (91)	30.8% (112)

App. Table 19b. Association between receiving high level of *client advocacy* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Client Advocacy Utilization				
Low	1.0		1.0	
High	0.94	(0.63, 1.39)	1.16	(0.83, 1.63)

App. Table 20a. Level of *dental* service utilization by change in health or quality of life outcome score

	Dental Service Utilization	
	Low % (n=121)	High % (n=163)
Health Outcome Score		
Stable/Improved	76.9% (93)	78.5% (128)
Declined	23.1% (28)	21.5% (35)
QOL Outcome Score		
Stable/Improved	75.2% (91)	79.1% (129)
Declined	24.8% (30)	20.9% (34)

App. Table 20b. Association between receiving high level of *dental* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Dental Utilization				
Low	1.0		1.0	
High	1.10	(0.63, 1.94)	1.25	(0.72, 2.19)

App. Table 21a. Level of *drug reimbursement* service utilization by change in health or quality of life outcome score

	Drug Reimbursement Service Utilization	
	Low % (n=53)	High % (n=73)
Health Outcome Score		
Stable/Improved	79.2% (42)	82.2% (60)
Declined	20.8% (11)	17.8% (13)
QOL Outcome Score		
Stable/Improved	77.4% (41)	82.2% (60)
Declined	22.6% (12)	17.8% (13)

App. Table 21b. Association between receiving high level of *drug reimbursement* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Drug Reimbursement Utilization				
Low	1.0		1.0	
High	1.21	(0.49, 2.96)	1.35	(0.56, 3.26)

App. Table 22a. Level of *food* service utilization by change in health or quality of life outcome score

	Food Service Utilization	
	Low % (n=593)	High % (n=596)
Health Outcome Score		
Stable/Improved	70.0% (415)	78.0% (465)
Declined	30.0% (178)	22.0% (131)
QOL Outcome Score		
Stable/Improved	67.5% (400)	71.8% (428)
Declined	32.5% (193)	28.2% (168)

App. Table 22b. Association between receiving high level of *food* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR**	95% CI	OR	95% CI
Level of Food Utilization				
Low	1.0		1.0	
High	1.52	(1.17, 1.98)	1.23	(0.96, 1.58)

**p-value ≤ .01

App. Table 23a. Level of *housing* service utilization by change in health or quality of life outcome score

	Housing Service Utilization	
	Low % (n=242)	High % (n=344)
Health Outcome Score		
Stable/Improved	76.9% (186)	79.4% (273)
Declined	23.1% (56)	20.6% (71)
QOL Outcome Score		
Stable/Improved	66.5% (161)	70.9% (244)
Declined	33.5% (81)	29.1% (100)

App. Table 23b. Association between receiving high level of *housing* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Housing Utilization				
Low	1.0		1.0	
High	1.16	(0.78, 1.72)	1.23	(0.86, 1.75)

App. Table 24a. Level of *mental health* service utilization by change in health or quality of life outcome score

	Mental Health Service Utilization	
	Low % (n=175)	High % (n=253)
Health Outcome Score		
Stable/Improved	66.3% (116)	67.6% (171)
Declined	33.7% (59)	32.4% (82)
QOL Outcome Score		
Stable/Improved	53.7% (94)	66.4% (168)
Declined	46.3% (81)	33.6% (85)

App. Table 24b. Association between receiving high level of *mental health* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR**	95% CI
Level of Mental Health Utilization				
Low	1.0		1.0	
High	1.06	(0.70, 1.60)	1.70	(1.15, 2.53)

**p-value ≤ .01

App. Table 25a. Level of *peer support* service utilization by change in health or quality of life outcome score

	Peer Support Service Utilization	
	Low % (n=71)	High % (n=70)
Health Outcome Score		
Stable/Improved	71.8% (51)	68.6% (48)
Declined	28.2% (20)	31.4% (22)
QOL Outcome Score		
Stable/Improved	71.8% (51)	85.7% (60)
Declined	28.2% (20)	14.3% (10)

App. Table 25b. Association between receiving high level of *peer support* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR*	95% CI
Level of Peer Support Utilization				
Low	1.0		1.0	
High	0.87	(0.42, 1.76)	2.35	(1.01, 5.48)

*p-value ≤ .05

App. Table 26a. Level of *primary care* service utilization by change in health or quality of life outcome score

	Primary Care Service Utilization	
	Low % (n=111)	High % (n=124)
Health Outcome Score		
Stable/Improved	65.8% (73)	67.7% (84)
Declined	34.2% (38)	32.3% (40)
QOL Outcome Score		
Stable/Improved	74.8% (83)	84.7% (105)
Declined	25.2% (28)	15.3% (19)

App. Table 26b. Association between receiving high level of *primary care* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Primary Care Utilization				
Low	1.0		1.0	
High	1.09	(0.64, 1.88)	1.86	(0.97, 3.57)

App. Table 27a. Level of *substance abuse* service utilization by change in health or quality of life outcome score

	Substance Abuse Service Utilization	
	Low % (n=98)	High % (n=99)
Health Outcome Score		
Stable/Improved	68.4% (67)	75.8% (75)
Declined	31.6% (31)	24.2% (24)
QOL Outcome Score		
Stable/Improved	75.5% (74)	72.7% (72)
Declined	24.5% (24)	27.3% (27)

App. Table 27b. Association between receiving high level of *substance abuse* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Substance Abuse Utilization				
Low	1.0		1.0	
High	1.45	(0.77, 2.71)	0.87	(0.46, 1.64)

App. Table 28a. Level of *transportation* service utilization by change in health or quality of life outcome score

	Transportation Service Utilization	
	Low % (n=421)	High % (n=425)
Health Outcome Score		
Stable/Improved	73.2% (308)	75.8% (322)
Declined	26.8% (113)	24.2% (103)
QOL Outcome Score		
Stable/Improved	70.5% (297)	70.6% (300)
Declined	29.5% (124)	29.4% (125)

App. Table 28b. Association between receiving high level of *transportation* services (vs. receiving low level) and having stable/improved in health or quality of life outcome scores

	Stable/Improved Health Outcome Scores		Stable/Improved QOL Outcome Scores	
	OR	95% CI	OR	95% CI
Level of Transportation Utilization				
Low	1.0		1.0	
High	1.15	(0.84, 1.56)	1.00	(0.75, 1.35)