Medicaid Redesign Team
Supportive Housing Evaluation

Outcomes Report 2
Volume 2: Treatment versus Comparison Group Pre-Post Analyses

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Executive Summary

This report details outcomes related to quality of life associated with enrollment in programs sponsored by the New York State Medicaid Redesign Team's Supportive Housing initiative (MRT-SH). It also includes a summary of these projects and selected outcomes for Treatment participants (i.e., clients enrolled in MRT-SH) versus a Comparison group of people similar to MRT-SH clients but who were not enrolled. For each included MRT-SH participant, outcomes data are presented from one year before participant enrollment through the first year post-enrollment; for each included comparison participant, outcomes data are presented for a similar two-year timespan. The goal of the analysis is to present a comparison between changes in outcomes before and after MRT-SH program enrollment for enrolled clients versus similar but not enrolled Medicaid users.

These outcomes include overall inpatient utilization (both as a binary yes/no variable, as well as number of days utilized), overall emergency department (ED) utilization (again as a binary yes/no variable as well as number of visits), inpatient and ED use for certain conditions of interest (e.g., behavioral health conditions, housing-sensitive conditions), and potentially preventable ED use. Other outcomes of interest are nursing home utilization, homeless shelter stays, and recorded mortality. It should be noted that the propensity score modeling and subsequent matching procedure were optimized around Medicaid costs, not service utilization. As such, matched pairs of clients have similar levels of pre-period Medicaid spending, but are not necessarily similar in their pre-period utilization of services. Pre-period differences in utilization-based outcomes require a difference-in-differences approach to assessing treatment effects, which is less ideal than using a propensity score model specifically optimized for these outcomes.

INCLUSION CRITERIA AND METHODOLOGY

MRT-SH Treatment participants were included for analysis provided that they were enrolled prior to October 2016 in a program determined to be appropriate for a comparison group approach, and provided that, for the period spanning from one year prior to program enrollment to one year after enrollment, they had full, continuous Medicaid coverage. Participants were included in the analysis according to an intent-to-treat methodology, such that participants were retained for analysis whether or not they remained enrolled in supportive housing for the post-period. Additionally, all clients were required to have at least one claim in one of the four major diagnostic categories (i.e., with a primary diagnosis of a serious mental illness (SMI), substance use disorder (SUD), HIV, or another chronic condition) during their pre-period year.

Comparison group participants were selected from a random sample of New York State Medicaid users who met these same coverage criteria and who had at least one claim in one of the four major diagnostic categories during their pre-period year between 2011 and 2017. All Treatment and Comparison clients were required to have some Medicaid spending in their pre-period year.

A matched set of comparison clients was then selected from this sample using a Propensity Score Matching approach; see Comparison Group report for more details. These procedures resulted in 2,037 pairs of unique Treatment and matched Comparison clients available for analysis. Pre- and post-period spending were then computed and compared between the Treatment and Comparison group participants to determine whether there was an interaction between time and group on changes in outcomes, and thus whether the Treatment group showed better outcomes than the Comparison group.

KEY FINDINGS

- The Comparison group clients unexpectedly had higher pre-period utilization of inpatient services than the Treatment clients. This may have been an artifact of the matching procedure, which prioritized matches on Medicaid spending. The Comparison group also showed significantly larger decreases in post-period inpatient utilization than the Treatment group.
  - » These findings should be revisited with a model that is optimized for inpatient utilization rather than spending (i.e. pre-period inpatient utilization should be fixed in the matching process).

- Overall, a significant treatment effect was found for the average number of ED visits (although no effect was found for the percentage of clients with ED visits).

- There was a significant treatment effect on the average number of primary care visits, but not on whether or not they had any primary care use. This took the form of a reduction rather than an increase in primary care visits, which may reflect a lower incidence of minor medical complaints requiring primary care evaluation and management.

- Utilization related to behavioral health and housing-sensitive conditions followed the pattern of utilization overall – the Comparison group had significantly larger decreases in inpatient use for all of these conditions, while the Treatment group had significantly larger decreases in ED use for SUD and housing-sensitive conditions (but not for SMI).

- The most robust treatment effects were found for reductions in potentially preventable ED use.

  » The Treatment group experienced significantly greater pre-post reductions in ED visits for routine complaints, for non-emergent conditions, for emergent but primary care treatable conditions, for avoidable conditions, and for alcohol-related conditions.

- There were robust treatment effects found for nursing home use, with Treatment clients experiencing a reduction in the percent with nursing home stays and the total number of (non-nursing home) inpatient days, while Comparison clients experienced an increase in inpatient days.

  » It should be noted that pre-period nursing home use was not well-balanced between the two groups, so this finding merits further study with a model optimized for this purpose.

- The Treatment group had significantly greater decreases in the use of homeless shelters and Office of Mental Health (OMH) residential settings than the Comparison group.

  » This is not surprising as MRT-SH programs are designed to replace these settings, but highlights the positive impact of MRT-SH programs in helping clients avoid these settings, and thus improve quality of life.

- Mortality after the end of the post-period is much lower for Treatment clients. This effect persists for up to three years after the end of the post-period year (and the findings in the fourth year trended in the right direction but were not statistically significant).

DIRECTIONS FOR FUTURE RESEARCH

- Some comparisons were also made between pairs of Treatment and Comparison clients who met the same diagnostic criteria or had the same prior housing histories.

  » There were not enough matched pairs of clients with HIV or with either type of OMH housing history to analyze.

- These analyses are more limited, as the compared subgroups were not selected to necessarily match each other (and thus the results seen could be attributable to other demographic or clinical differences).

- The same patterns of inpatient and ED use were generally found for all diagnostic groups as for the sample overall, except that a treatment effect was not found for number of ED visits among client pairs with chronic medical conditions or with three or more types of conditions.

- The same patterns of inpatient and ED use were found among shelter users as for the sample overall, except that a treatment effect was not found for number of ED visits.

- Future work should examine these patterns more in-depth through models specifically optimized for these comparisons.

CONCLUSIONS

MRT-SH appears to have a robust effect on number of ED visits, both overall and for various types of conditions. This seems to be particularly true of potentially preventable ED visits. While ED visits are not one of the major drivers of costs for this population, as established in the Cost 2 report, this is a promising indication of improvements in client well-being as a result of MRT-SH.

MRT-SH programs also show promise in keeping clients out of high-cost residential settings. Significant treatment effects were observed for reductions in the use of nursing homes, homeless shelters, and OMH residential settings. Not only are these settings expensive, but likely less conducive to client psychological well-being.

Finally, the MRT-SH program is associated with fewer client deaths after the post-period. (Clients who died during the post-period would have been excluded from the study sample.) This effect appeared to persist for up to four years after MRT-SH enrollment (i.e. up to three years after the post-period end).

These promising findings are balanced against the consistent finding that the Comparison group clients have greater reductions in inpatient use than the Treatment clients. This unexpected result was statistically significant for many types of inpatient use, and for all the subgroups examined. It is not clear why this would be the case, but is possible that it is related to the matching procedure, which was optimized for matching on cost and may have resulted in artificially greater imbalance on pre-period inpatient use as a result.

Despite the unexpected results for inpatient use, however, the MRT-SH program shows promise in improving several aspects of client well-being, even compared to a matched Comparison group of similar clients.

Introduction

This report details changes in quality of life-related outcomes associated with enrollment in programs sponsored by the New York State Medicaid Redesign Team's Supportive Housing initiative (MRT-SH). It also includes a summary of these projects and the outcomes for both Treatment participants (i.e., clients enrolled in MRT-SH) and Comparison group participants similar to MRT-SH clients but who were not enrolled. For each included MRT-SH participant, outcomes data are presented from one year before participant enrollment through the first year post-enrollment; for each included Comparison participant, outcomes data are presented for a similar two-year timespan. The goal of the analysis is to present a comparison between outcomes before and after MRT-SH program enrollment for enrolled clients (Treatment) versus similar but not enrolled Medicaid users (Comparison).[1]

These outcomes include overall inpatient utilization (both as a binary yes/no variable as well as number of days of utilization), overall emergency department (ED) utilization (again as a binary yes/no variable and in number of visits), inpatient and ED use for certain conditions of interest (e.g., behavioral health conditions, housing-sensitive conditions), and potentially preventable ED use. Other outcomes of interest are nursing home utilization, homeless shelter stays, and recorded mortality.

Additionally, this report is based on the clients who had enrolled in these programs through September 2017. Medicaid beneficiaries move in and out of eligibility regularly. Therefore, this analysis is accurate for the participants in the sample; changes in program targeting may shift the outcomes seen. These descriptive analyses are based on a small panel of enrollees, and future estimates will depend in part on the clinical characteristics of new enrollees in these programs.

It should be noted that the propensity score modeling and subsequent matching procedure were optimized around Medicaid costs, not service utilization. As such, matched pairs of clients have similar levels of pre-period Medicaid spending, but are not necessarily similar in their pre-period utilization of services (i.e., use of inpatient and ED services in the pre-period were factors in estimating the propensity scores which clients were matched on, but clients were not matched on these factors directly). Pre-period differences in utilization-based outcomes require a difference-in-differences approach to assessing treatment effects, which is less ideal than using a propensity score model specifically optimized for these outcomes.

GOALS OF THE MEDICAID REDESIGN TEAM SUPPORTIVE HOUSING (MRT-SH) INITIATIVE

To address unprecedented health care cost growth and improve health care quality in New York's Medicaid program, Governor Andrew M. Cuomo created the Medicaid Redesign Team to develop a multi-year reform plan. Medicaid Redesign is premised on the idea that the only way to successfully control costs is to improve the health of program participants.

Studies have shown the powerful effects of social determinants of health, such as safe housing, nutrition, and education. However, the public spending dedicated to these social determinants is small relative to national health care spending overall.[2] Research also indicates that 5% of consumers are responsible for 50% of health care costs.[3] In particular, the population targeted for the supportive housing program has high rates of ED utilization and inpatient hospitalizations, due in part to their greater likelihood of suffering from multiple chronic medical problems, behavioral health problems, and environmental risk factors associated with a lack of stable housing.

New York has recognized housing as a critical health intervention, with supportive housing identified as a promising model. Supportive housing is affordable housing paired with supportive services, such as on-site case management and referrals to community-based services[4]. As a result, New York has allocated substantial funding from the State's Medicaid Redesign

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[1] Note that for participants who are dually eligible for Medicaid and Medicare, Medicare costs are not included in the analysis.

[2] Bradley EH, Elkins BR, Herrin J, Elbel B. Health and social services expenditures: associations with health outcomes. *BMJ Quality & Safety*. 2011;20(10):826-831.

[3] Stanton MW, Rutherford MK. The high concentration of U.S. health care expenditures. Rockville (MD): *Agency for Healthcare Research and Quality*; 2005. Research in Action Issue 19. AHRQ Pub. No. 06-0060.

[4] Doran KM, Misa EJ, Shah NR. Housing as Health Care – New York's Boundary-Crossing Experiment. *New England Journal of Medicine*. 2013;369:2374-2377.

dollars to provide supportive housing to homeless, unstably housed, and/or other individuals with complex needs, who are high-cost, high-need Medicaid users. It is anticipated that MRT-SH will reduce the more expensive forms of health care utilization (ED visits, inpatient hospitalizations, and nursing home stays), potentially reduce overall health care costs, and improve quality of life and health outcomes.

INCLUDED MRT-SH PROJECTS

While MRT-SH initiatives include more than 50 capital projects and 20 rental subsidy and supportive services programs and pilots, not all programs were appropriate to include in this comparison group testing. Table 1 below shows the programs that are included in the outcomes study in the body of this report. Supportive housing enrollment data for each MRT supportive housing participant included in this analysis is based on program records.[5] Medicaid spending is based on Medicaid Data Warehouse (MDW) information for dates of service through 6/9/2019.[6]

Table 1. Summary Characteristics of MRT Supportive Housing Projects Included in Outcomes 2 Volume 2 Analyses

Program	Population Served	Number of People included in Outcomes 2 Volume 1 Report	Number of People included in Outcomes 2 Volume 2 Report
All MRT-SH Programs		**2,348**	**2,037**
Department Of Health – AIDS Institute			
AIDS Institute Services & Subsidies	HIV-positive adults living outside NYC, often referred by Health Homes	149	117
AIDS Institute Pilot	Homeless and unstably housed Health Home-eligible individuals in New York City who were diagnosed with HIV but did not qualify for other existing programs	17	13
Homes and Community Renewal (HCR): Capital			
East 99th Street	Physically disabled adults who did not qualify for existing New York City SH programs	150	107
3361 Third Ave	Chronically homeless single adults who suffer from a serious and persistent mental illness or who are diagnosed as mentally ill and chemically addicted	34	27
Boston Road		76	58
Norwood Terrace		29	28
VOA Creston Avenue		19	17
Office of Temporary and Disability Assistance (Homeless Housing and Assistance Program Capital)			
Opportunities for Broome	Chronically homeless single adults who are recovering from drug and/or alcohol abuse or have a mental illness or other disability	14	9
Son House	Chronically homeless single adults who have a documented disability	26	23
Hope Gardens	Chronically homeless single women with special needs such as mental illness, drug and alcohol abuse, or a history of domestic violence or physical or sexual assault	17	13
Evergreen Loft Apartments	Homeless adults who are living with HIV/AIDS, have a disabling health condition, and/or are physically disabled	22	12
Office of Temporary and Disability Assistance (Other)			
Homeless Senior and Disabled Placement Program	Health Home-eligible SSI recipients living in New York City homeless shelters	199	146

[5] Program record verification dates: HHAP capital projects for participants enrolled through 5/2017; AIDS Institute programs and Health Homes Supportive Housing Pilot through 7/2017; OASAS-RSS and OPWDD-RSS through 8/2017; East 99th Street through 9/2017; HCR Capital projects, OMH RSS and RSB, and NHIL through 10/2017; Access to Home Expansion program through 11/2017.

[6] Data was extracted on 3/27/2018, Medicaid claim cycle 2123.

Office of Mental Health			
Rental Subsidies - Brooklyn	Single, Health Home eligible adults with a serious mental illness who either live in Brooklyn, are referred by a Brooklyn-based Health Home, reside in an OMH-operated residential program, or are discharged from an Article 28 or Article 31 hospital. Individuals must also be unstably housed or be individuals for whom housing would assist in a hospital diversion	336	290
Rental Subsidies - Statewide	Single, Health Home-eligible adults with a serious mental illness who are either referred by a Health Home, reside in an OMH Psychiatric Center or OMH-operated residential program, or are discharged from an Article 28 or Article 31 hospital. Individuals must also be unstably housed or be individuals for whom housing would assist in a hospital diversion	467	415
Office of Alcoholism and Substance Abuse Services			
OASAS Rental Subsidies Statewide	Single adults with a substance use disorder who are homeless, unstably housed, or at risk of homelessness; are Medicaid eligible; and meet frequent utilizer criteria	441	436
Department Of Health – Office of Health Insurance Programs			
Health Homes Supportive Housing Program	Homeless or unstably housed Health Home members	319	294
Nursing Home to Independent Living (Transitions)	Individuals who are elderly or physically disabled, homeless or unstably housed, and have transitioned out of a nursing home with program assistance	33	32
Comparison Clients			
No MRT-SH Enrollment	See Comparison Group report for client selection methodology, client characteristics.	0	2,037

ANALYSIS INCLUSION CRITERIA

All analyses presented below are for those programs that began enrolling participants prior to October 2016 and were determined to be appropriate for a comparison group approach. Participants were included for analysis provided that they were enrolled prior to October 2016, and provided that, for the period spanning from one year prior to program enrollment to one year after enrollment, they met both of the following full Medicaid coverage criteria:

1. No coverage under a Medicaid coverage type that was considered less than full coverage; and

2. No period of 60 days or longer without full Medicaid coverage.

Additionally, clients were required to have at least one claim for a primary diagnosis of a serious mental illness (SMI), substance use disorder (SUD), HIV, or another chronic condition during their pre-period year, and to have at least some Medicaid claim cost in that year (i.e., at least some spending was required).

Outcomes for clients meeting these criteria were then analyzed over the twelve months prior to and twelve months after program enrollment. Participants were included in the analysis according to an intent-to-treat methodology, such that participants were retained for analysis whether or not they remained enrolled in supportive housing for the post-period.

Comparison group participants were selected from a random sample of New York State Medicaid users who met these same coverage criteria and who had at least one claim for a primary diagnosis of SMI, SUD, HIV, or another chronic condition during their pre-period year between 2011 and 2017; as with the Treatment group, all clients were required to have some Medicaid spending in their pre-period year. A matched set of comparison clients was then selected from this sample using a Propensity Score Matching approach; see Comparison Group report for more detail.

CLIENT CHARACTERISTICS

Comorbidities. Diagnoses were taken from the primary diagnosis of claims in the pre-period. As such, these rates likely underrepresent incidence, as clients with a chronic illness may not have had any claims for which their condition was the primary diagnosis in their pre-period year. However, this gap was assumed to be small as most of these conditions result in regular claims. The "other chronic condition" category was comprised of twelve common chronic conditions: hypertension, asthma, diabetes, osteoarthritis, coronary heart disease, chronic kidney disease, chronic obstructive pulmonary disease, cerebrovascular disease, congestive heart failure, cancer, angina, and acute myocardial infarction.

The population served by the MRT-SH programs is a seriously ill population with high rates of comorbidities. Additionally, given the inclusion criteria of at least one pre-period claim with a diagnosis in one of our four major categories, all MRT-SH Treatment and Comparison clients had at least some diagnosis, thus increasing the rates of occurrence compared to the original MRT-SH sample for all but HIV. This decrease for HIV was not unexpected, though, given the exclusion of the AIDS Institute: Services Only program from all analyses involving the comparison group. Importantly, the rates of occurrence were highly similar between the final selected Treatment and Comparison groups (see Table 2A).

Table 2A. Comorbidity Distribution for Treatment and Comparison Clients

	Original MRT-SH	Treatment	Comparison
Serious Mental Illness	62%	77%	78.5%
Substance Use Disorder	41%	51.5%	54%
Other Chronic Condition	33.5%	49%	52%
HIV	23.5%	5%	5%
3 or more of the above	24%	20%	21%
All 4 of the above	3%	1%	1.5%

Enrollment Duration. As analyses followed an intent-to-treat methodology, not all Treatment participants in the study were retained in MRT-SH for a full year. Across all included MRT-SH Treatment clients, about one-quarter were enrolled for a maximum of 1 year, about one-third were enrolled for one to two years, and just over one-third for more than 2 years. These rates were reasonably similar to those in the original MRT-SH sample. No comparison clients were enrolled at MRT-SH programs at any point (see Table 2B).

Table 2B. Enrollment Duration for Enrollees Analyzed

	Original MRT-SH	Treatment
Less than 6 months	13%	11%
Between 6 and 12 months	19%	16%
Between 13 and 18 months	19%	14%
Between 19 and 24 months	15%	20%
More than 24 months	33%	39%

Care Coordination. Pre-period enrollment in care coordination services did differ between the original MRT-SH sample and the final selected group, but was quite similar between the selected MRT-SH Treatment and Comparison participants. About two-fifths were enrolled in Medicaid Managed Care, about two-fifths were enrolled in Health Homes, and about one-tenth were dually eligible for Medicaid and Medicare (see Table 2C).

Table 2C. Care Coordination for Enrollees Analyzed

	Original MRT-SH	Treatment	Comparison
Medicaid Managed Care Enrollment	70.5%	41%	43%
Health Homes Enrollment[7]	55%	38.5%	38%
Dual Eligibility	23%	9%	11.5%

Prior Housing Status. Homeless shelter history was defined as any pre-period stay in a shelter facility that reports to the Homeless Management Information System (HMIS) in one of the regions[8] for which the evaluation team was able to obtain HMIS data. Office of Mental Health (OMH) residential facility history was defined as any pre-period stay recorded in CAIRS or MHARS. Nursing home history was defined as having at least $1,000 worth of nursing home-related claims in the pre-period.[9] The selected Treatment and Comparison groups had similar rates of pre-period HMIS and OMH use, but the Comparison group had a much greater incidence of pre-period nursing home use than did the Treatment (see Table 2D).

Table 2D. Prior Housing Status for Enrollees Analyzed

Prior Housing Status Distribution	Treatment	Comparison
Homeless/In Shelter (HMIS)	18%	18%
OMH (CAIRS or MHARS)	4.5%	6%
Nursing Home (from claims)	2.5%	15%

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[7] Health Homes Enrollment was determined based on presence of Health Homes outreach or enrollment claims.

[8] New York City, Hudson Valley, Capital District, Adirondacks, Long Island, and Central New York

[9] Two Treatment and one Comparison client had nursing home claims of less than $1000 in the pre-period; none had any nursing-home related post-period spending, and inclusion of these participants did not shift any results.

Methodology

Medicaid Data Warehouse (MDW) fee-for-service claims (excluding capitation payments) and managed care plan reported (encounter) data, pulled on 12/9/2019 (thus valid through 6/9/2019)[10], were used to assess pre- and post-period outcomes. For program participants who are dually eligible for Medicare and Medicaid, only Medicaid claims were analyzed in the analysis. Additionally, the cost of the MRT-SH intervention is not included in any of the analyses that follow.

It should be noted that the propensity score modeling and subsequent matching procedure were optimized around Medicaid costs, not service utilization. As such, matched pairs of clients have similar levels of pre-period Medicaid spending, but are not necessarily similar in their pre-period utilization of services. (Use of inpatient and ED services in the pre-period were factors in estimating the propensity scores which clients were matched on, but clients were not matched on these factors directly.) Pre-period differences in utilization-based outcomes require a difference-in-differences approach to assessing treatment effects, which is less ideal than using a propensity score model specifically optimized for these outcomes.

Pre- and post-period outcomes were compared between the Treatment and Comparison group participants. Pre-post differences in each outcome were calculated for each of the two groups, and the Treatment versus Comparison difference in pre-post differences was examined using a McNemar-Bowker test for binary variables[11] and a Wilcoxon signed rank test for count variables. Both are designed for related or paired samples.

Propensity Score Quintiles. The propensity scores estimated from the propensity score model (see Comparison Group report for more detail) represent a client's expected likelihood of being selected into an MRT-SH program. In order to assess whether outcomes are better for clients with a greater likelihood of selection, clients were divided into five roughly equal strata (quintiles) of estimated propensity score (see Table 3). Because Treatment and Comparison clients were matched on propensity score, there are equal numbers from both groups in each strata.

Table 3. Propensity Score Quintile Bounds and N of Matched Pairs per Quintile

[5.77e-05,0.00726]	404
(0.00726,0.0178]	406
(0.0178,0.0388]	409
(0.0388,0.0921]	409
(0.0921,0.697]	409

Outcome variables. These outcomes include overall inpatient utilization (both as a binary yes/no variable and number of days), overall ED utilization (again as a binary yes/no variable and number of visits), inpatient and ED use for certain conditions of interest (e.g., behavioral health conditions, housing-sensitive conditions), and potentially preventable ED use. Other outcomes of interest are nursing home utilization, homeless shelter stays, stays in OMH residential settings and state psychiatric centers, and recorded mortality.

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[10] Client claims were assumed to be complete within six months. As such, a six-month claims lag was instituted, wherein data pulled on 10/17/2019 was assumed to be complete for services provided through 4/17/2019.

[11] The pre-post difference variables for binary variables had 3 values (-1, 0, or 1). As such, the Bowker extension for the McNemar test was required for a 3X3 table. Some literature suggests that such a 3-category variable can be treated as an ordinal variable, and the Spearman's correlation test for matched pairs was also performed.

DIRECTIONS FOR FUTURE RESEARCH: DIAGNOSIS AND PRIOR HOUSING STATUS

Outcomes for MRT-SH Treatment and Comparison clients within each diagnostic subgroup (except HIV, for which there were too few matched pairs), and with three or more diagnoses were compared. Outcomes for clients with pre-period histories of stays in homeless shelters were also specifically examined. Pairs within each of these subgroups were only analyzed if both matched clients had the subgroup characteristic (e.g. both clients had an SMI or both clients had a shelter stay).

Again, though, while diagnosis and homeless shelter were included as variables in the propensity score model, matching on these items was not required for pair selection. As such, while the subgroup of participants with each diagnosis or prior housing status can be identified, and outcomes compared under the same procedures, the subgroups are not necessarily well-matched on pre-period outcomes or on any other modeled factor (e.g., demographics, histories, etc.). Pre-period outcomes must thus be carefully examined, and interpretations and conclusions from any interactions found limited, as differences may be driven by some other unbalanced factor.

Expected Outcomes

Overall inpatient and ED use were included as factors in the propensity score matching model, but pairs were not required to be matched on these factors. It was hoped that pre-period rates of inpatient and ED use would not differ on these factors, but in fact the Comparison group had significantly higher rates of pre-period inpatient use. This may have been in part because the pairs were required to be matched on Medicaid spending, for which the model was optimized, and the required matching on spending levels may have required greater mismatching in inpatient use in order to achieve matches on spending. Furthermore, subcategories of inpatient and ED use were not included in the model at all, so pre-period differences in those measures were anticipated. The same is true of primary care and nursing home utilization.

The Outcome 2 Volume 1 report demonstrated a significant overall decrease in both inpatient and ED use for Treatment clients from pre- to post-period. As such, Treatment clients included here were also expected to show such a decrease. Comparison group clients were not particularly expected to show significant changes in outcomes from pre- to post-, as by definition they did not receive the intervention.

Most importantly, the decline in inpatient and ED use for the Treatment group across the period tested was expected to be significantly larger than any decline for Comparison clients.

Results

OVERALL UTILIZATION OF INPATIENT SERVICES

A variable for receiving any pre-period inpatient care was included in the propensity score model, but the number of inpatient days was not. After propensity score matching, significant differences remained between the Treatment and Comparison groups in the percent receiving any inpatient care, with the Comparison group more likely to have inpatient care in the pre-period.

The number of pre-period inpatient days also varied significantly between the two groups, with the Comparison group having more inpatient days on average. Some of this pre-period difference may have resulted from the fact that cost decile was "fixed" in the propensity score model (i.e. matched pairs were required to be in the same cost decile to make a match); this exact matching requirement on cost decile would have been expected to reduce the quality of the match on other measures.

Both the Treatment and Comparison groups experienced statistically significant pre-post decreases in the percent of participants having any inpatient care and the average number of inpatient days. The percentage of Treatment and Comparison clients with any inpatient care was the same in the post-period, despite a significantly higher rate for Comparison clients in the pre-period. This was because the Comparison group experienced a significantly larger decrease than the Treatment group, with the rate of inpatient use for the Treatment clients dropping by 12 percentage points or 25%, and the rate of inpatient use for the Comparison clients dropped 21 percentage point or 36%.

The average number of inpatient days in the post-period was significantly lower for the Treatment than the Comparison group, though it had also been significantly lower in the pre-period. Once again, the Comparison group experienced a significantly larger decrease than the Treatment group, with the average number of inpatient days dropping by 4.5 days or 40% for the Treatment clients compared to 7.1 days or 48% for the Comparison clients.

Table 4. Overall Inpatient Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre-Period	Y1 Post-Period	Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
			Pre-Post Diff		
Inpatient utilization					
Any inpatient care					
Treatment	49%	37%	–12%	–25%	***
Comparison	59%	38%	–21%	–36%	***
T - C Difference (raw)	–10%	–1%			
p-value (T–C)	***	n.s.			***
Average number inpatient days					
Treatment	11.2	6.7	4.5	–40%	***
Comparison	14.9	7.8	7.1	–48%	***
T - C Difference (raw)	–2.4	–0.2			
p-value (T–C)	***	**			***

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

By Propensity Score Quintile. When inpatient utilization was looked at by propensity score quintile, there was a clear pattern among both groups such that pre-period inpatient utilization was associated with higher propensity scores (consistent with the propensity score matching model). At all propensity score quintiles, the Comparison group showed more inpatient utilization than the Treatment group (although this was not statistically significant for inpatient days for the middle quintile).

The decrease in any inpatient use was significantly less for Treatment clients than for their matched Comparison counterparts in all quintiles except for the highest. The pre-post change in number of inpatient days showed a significantly greater decrease among the Comparison group in the lower two quintiles, but was not statistically significant in the other three.

Table 5. Inpatient Utilization by Likelihood of Selection into MRT: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Any inpatient utilization					Avg. number inpatient days				
	Pre-Period	Y1 Post-Period	Raw (Post-Pre)	% of pre	P-value	Pre-Period	Y1 Post-Period	Raw (post – pre)	% of pre	P-value
Lowest 20% selection likelihood										
Treatment	31%	27%	–4%	–13%	n.s.	5.3	4.0	–1.3	–25%	*
Comparison	47%	21%	–26%	–55%	***	6.8	2.7	–4.1	–60%	***
T - C Difference	–16%	6%				–1.5	1.3			
p-value (T–C)	***	*			***	***	*			***
Medium-low selection likelihood										
Treatment	39%	34%	–9%	–19%	n.s.	6.3	4.4	–1.9	–30%	**
Comparison	55%	30%	–25%	–45%	***	10.8	4.0	–6.8	–63%	***
T - C Difference	–16%	4%				–4.5	0.4			
p-value (T–C)	***	n.s.			***	***	n.s.			***
Medium selection likelihood										
Treatment	48%	39%	–9%	–19%	**	9.6	6.8	–2.8	–29%	***
Comparison	55%	32%	–23%	–42%	***	12.4	6.1	–6.3	–51%	***
T - C Difference	–7%	7%				–2.8	0.7			
p-value (T–C)	*	n.s.			**	n.s.	n.s.			n.s.
Medium-high selection likelihood										
Treatment	57%	39%	–18%	–32%	***	15.3	7.3	–8.0	–52%	***
Comparison	63%	39%	–24%	–38%	***	16.7	11.2	–5.5	–33%	***
T - C Difference	–6%	0%				–1.4	–3.9			
p-value (T–C)	n.s.	n.s.			**	*	n.s.			n.s.
Highest 20% selection likelihood										
Treatment	70%	48%	–22%	–31%	***	19.5	15.1	–4.4	–23%	***
Comparison	77%	51%	–26%	–34%	***	28.0	13.1	–14.9	–53%	***
T - C Difference	–7%	–3%				–8.5	2.0			
p-value (T–C)	*	n.s.			n.s.	***	n.s.			n.s.

*** p =<0.001, **p>0.001 & p=<0.01, *p>0.01 & p=< 0.05, n.s. = not statistically significant

Conclusions on Overall Inpatient Utilization. Contrary to expectations, there is no evidence of a treatment effect for overall inpatient utilization, whether measured as a binary variable or in number of inpatient days. Indeed, where statistically significant differences between the Treatment clients and their Comparison group matches exist, it is the case that the Comparison group clients experienced a larger pre-post decrease in their use of inpatient services relative to their Treatment counterparts. This is consistent with the category of service findings in Cost Report 2, Volume 2, which found that inpatient costs decreased for both groups of Medicaid clients, but decreased more for Comparison group clients than Treatment group clients.

It is not clear why this would be the case except that the Comparison group clients had higher inpatient use to begin with, possibly as an artifact of a matching process that prioritized pre-period cost matching. Their higher pre-period values made them more subject to "regression to the mean," meaning, in simple terms, that their numbers had more room to drop. The optimal approach to study the effects of treatment on inpatient utilization would be to construct a propensity score model that was optimized for inpatient variables in order to ensure that both Treatment and Comparison clients were matched on their pre-period levels of inpatient use. This is an approach for future research.

OVERALL UTILIZATION OF EMERGENCY DEPARTMENT SERVICES

Good balance was achieved on the variable for any ED utilization, with no significant difference between the Treatment and Comparison groups in the pre-period. However, the number of ED visits varied significantly between the two groups, with the Treatment group having more pre-period ED visits.

Both groups experienced statistically significant pre-post decreases in both metrics, but the Comparison group experienced a significantly larger decrease in the percentage of those with any ED visit, while the Treatment group experienced a larger decrease in the average number of ED visits.

Table 6. Overall ED Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre-Period	Y1 Post-Period	Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
			Pre-Post Diff		
Emergency department utilization					
Any ED visits					
Treatment	68%	58%	−10%	−15%	***
Comparison	67%	54%	−13%	−19%	***
T - C Difference (raw)	1%	4%	3%		
p-value (T–C)	n.s.	**			*
Average number of ED visits					
Treatment	3.7	2.5	−1.2	−32%	***
Comparison	2.7	2.3	−0.4	−15%	***
T - C Difference (raw)	1.0	0.2	0.8		
p-value (T–C)	***	n.s.			***

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

By Propensity Score Quintile. When ED utilization was looked at by propensity score quintile, there was a clear pattern among both groups that pre-period ED utilization was associated with higher propensity scores (consistent with the propensity score matching model). The Comparison group clients had a significantly higher percentage with any pre-period ED use compared to the Treatment group in the lowest quintile, but the opposite was true in the highest quintile. The two groups were not different in the three middle quintiles. The average number of ED visits in the pre-period did not vary between Treatment and Comparison group except in the highest quintile, where the Treatment group had significantly more pre-period ED visits (6.3 vs. 4.7).

The percentage of clients with post-period ED use did not significantly vary between Treatment and Comparison except in the highest two quintiles, where the Treatment group had significantly higher use than the Comparison group. The average number of ED visits in the post-period did not significantly vary between the two groups except for the fourth quintile (in which the Comparison group had significantly lower use than the Treatment group).

It should be noted, however, that in the top three quintiles, the Treatment group experienced much larger pre-post decreases in the average number of ED visits relative to the Comparison group (even though their post-period numbers remained the same or higher than the Comparison group). The difference in pre-post differences between members of matched pairs in any ED use was statistically significant for the fourth and fifth quintiles. The difference in the pre-post difference in the number of ED visits was statistically significant in the third and fifth quintiles, and in both cases the decrease was larger for the Treatment clients, consistent with expectations.

Table 7. ED Utilization by Likelihood of Selection into MRT: Treatment vs. Comparison Group, Pre- and Post-Enrollment

| | Any inpatient utilization | | | | | Avg. number inpatient days | | | | |
| | | | Pre-Post Diff | | | | | Pre-Post Diff | | |
	Pre-Period	Y1 Post-Period	Raw (Post-Pre)	% of pre	P-value	Pre-Period	Y1 Post-Period	Raw (post – pre)	% of pre	P-value
Lowest 20% selection likelihood										
Treatment	49%	46%	–3%	–6%	n.s.	2.0	1.6	–0.4	–20%	*
Comparison	56%	44%	–12%	–21%	***	1.9	1.4	–0.5	–26%	***
T – C Difference	–8%	2%				0.1	0.2			
p-value (T–C)	*	n.s.			n.s.	n.s.	n.s.			n.s.
Medium-low selection likelihood										
Treatment	60%	51%	–9%	–15%	**	2.4	1.8	–0.6	–25%	***
Comparison	62%	49%	–13%	–21%	***	1.9	1.4	–0.5	–26%	***
T – C Difference	–3%	2%				0.5	0.4			
p-value (T–C)	n.s.	n.s.			n.s.	n.s.	n.s.			n.s.
Medium selection likelihood										
Treatment	69%	61%	–8%	–12%	*	3.8	2.5	–1.3	–34%	***
Comparison	66%	56%	–10%	–15%	***	2.4	2.1	–0.3	–13%	***
T – C Difference	2%	5%				1.4	0.4			
p-value (T–C)	n.s.	n.s.			n.s.	n.s.	n.s.			*
Medium-high selection likelihood										
Treatment	71%	63%	–8%	–11%	**	4.0	2.8	–1.2	–30%	***
Comparison	72%	55%	–17%	–24%	***	2.7	2.1	–0.6	–22%	***
T – C Difference	–1%	8%				1.3	0.7			
p-value (T–C)	n.s.	*			**	n.s.	*			n.s.
Highest 20% selection likelihood										
Treatment	91%	72%	–19%	–21%	***	6.3	3.9	–2.4	–38%	***
Comparison	81%	65%	–16%	–20%	***	4.7	4.2	–0.5	–11%	**
T – C Difference	9%	7%				1.6	–0.3			
p-value (T–C)	***	*			**	***	n.s.			***

*** p =<0.001, **p>0.001 & p=<0.01, *p>0.01 & p=< 0.05, n.s. = not statistically significant

Conclusions on Overall ED Utilization. There is limited evidence to support a treatment effect on the use of any ED services. In contrast, there is good evidence to support a treatment effect on the number of ED visits. The Treatment clients showed a significantly greater reduction in the number of ED visits compared to their Comparison group matched counterparts. However these differences seemed to be concentrated in the third and especially the fifth propensity score quintiles. It should be noted that the propensity score matching model included ED use as a factor, and that the presence of any ED use in the pre-period was well-balanced between the Treatment and Comparison groups, but that the model was not

optimized for the purpose of investigating ED utilization. As a result, pre-period ED users in the Treatment group may have a somewhat different profile of other characteristics compared to ED users in the Comparison group.

PRIMARY AND PREVENTIVE CARE

Primary Care.[12] Primary care variables were not included in the propensity score matching model. Thus, it is not surprising that there were significant pre-period differences between the two groups in both the percentage receiving any primary care and the average number of primary care visits. For both metrics, the Treatment group started out significantly higher than the Comparison group.

Both groups experienced significant pre-post differences in both metrics, and in the post-period, the Treatment group continued to have significantly higher values than the Comparison group on both metrics. The difference in differences in the percent with any primary care visit was not statistically significant, but the Treatment group had a significantly larger pre-post decrease in the average number of primary care visits relative to the Comparison group.

Table 8. Primary Care Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	PostY1	Raw	% of pre	P-value
Any primary care visit					
Treatment	73%	63%	–10%	–14%	***
Comparison	61%	55%	–6%	–10%	***
T & C Difference	12%	7%			
p-value (T-C)	***	***			n.s.
Average # of primary care visits	4.8	3.6	–1.2	–25%	***
Treatment	4.8	3.6	–1.2	–25%	***
Comparison	3.4	2.8	–0.6	–18%	***
T & C Difference	1.4	0.8			
p-value (T-C)	***	***			***

*** p =<0.001

Both the Treatment and Comparison group participants had many primary care visits related to the selected routine medical conditions identified by Excellus Health[13]. The Treatment group had significantly more such visits in both the pre- and the post-period. Both groups experienced significant pre-post decreases in these visits, and the size of the decreases was not significantly different between the two groups.

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[12] After extensive consultation with medical advisors, the definition we used for primary care was 1) an evaluation and management (E&M) visit 2) to a primary care provider (general medicine, internal medicine, family practice, nurse practitioner, obstetrics and gynecology, primary care clinic, general practice, general preventive medicine, public health – preventive medicine) 3) in an outpatient setting (physician group, multi-type group service, diagnostic and treatment center, hospital-based outpatient service, physician services, or nurse practitioner).

[13] Ear infections, headaches, back and neck problems, sinus infections, sore throats, abdominal pains, digestive complaints (nausea, constipation and diarrhea), urinary tract infections, bumps and bruises, joint aches and pains, sprains and strains.

Table 9. Total Number of Visits to Primary Care Provider for Evaluation & Management of Routine Conditions: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	Post	Change		Sig.
Treatment	1,276	878	−398	−31%	***
Comparison	885	650	−235	−26%	***
T & C Difference	391	228			
p-value (T-C)	***	***			n.s.

*** p =<0.001

Conclusions on primary care utilization. The average number of primary care visits decreased significantly more for Treatment than for Comparison clients. While this was contrary to initial expectations, as discussed in Volume 1 of this report, it appears that MRT-SH clients may have fewer complaints that require a doctor's visit during the post-period. This idea receives some modest support in that Treatment clients have a slightly larger decrease in visits for routine conditions than the Comparison clients, although this difference was not statistically significant. Overall, however, it does not seem that the observed treatment effect on the number of ED visits reported above is a result of Treatment clients being more likely to receive primary care services.

INPATIENT UTILIZATION FOR BEHAVIORAL HEALTH

Severe Mental Illness. Although inpatient utilization was included in the propensity score matching model, utilization specifically for SMI was not. Nonetheless, the percent of clients with any inpatient stays for a mental health diagnosis (Dx) in the pre-period did not significantly vary between the two groups. The Comparison group did, however, have significantly more clients with at least one pre-period inpatient stay with a psychiatric rate code. In the post-period, the Treatment group had slightly but significantly more clients with an inpatient stay for a mental health diagnosis, while there was not a significant difference between the two groups in the percentage with a stay with a psychiatric rate code. Consistent with the findings for inpatient use overall, the Comparison group experienced significantly greater reductions than the Treatment group in both of these measures.

Table 10. Inpatient Utilization for Severe Mental Illness: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	Post	Raw (post − pre)	% of pre	P-value
Any inpatient for mental health (defined by Dx)					
Treatment	17%	11%	−6%	−35%	***
Comparison	18%	9%	−9%	−50%	***
T - C Difference	−1%	2%			
p-value (T-C)	n.s.	*			*
Any psychiatric inpatient (defined by rate code)					
Treatment	15%	10%	−5%	−33%	***
Comparison	19%	9%	−10%	−53%	***
T - C Difference	−4%	1%			
p-value (T-C)	***	n.s.			***

*** p =<0.001, n.s. = not statistically significant

Substance Use Disorders. Although inpatient utilization was included in the propensity score matching model, utilization specifically for SUD was not included. Nonetheless, the percent of clients with an inpatient stay with an SUD diagnosis during the pre-period did not vary significantly between the Treatment and Comparison groups. Both groups experienced pre-post decreases that were not significantly different, and this resulted in post-period inpatient use that was not significantly different.

The Treatment clients started out slightly but significantly less likely to have any inpatient rehabilitation stays relative to the Comparison group. Both groups experienced pre-post decreases that were not significantly different between groups, and the post-period difference was not statistically significant.

The Treatment group was significantly less likely to have any inpatient detox stays in the pre-period. Both groups experienced a significant pre-post decrease in the percentage with inpatient detox stays, but the decrease was significantly larger for the Comparison group clients. Despite this larger decrease, the Comparison group clients still had a significantly higher percentage with post-period detox use.

Table 11. Inpatient Utilization for Substance Use Disorder: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	Post	Raw	% of pre	P-value
Any inpatient for substance abuse					
Treatment	21%	13%	8%	–38%	***
Comparison	23%	13%	10%	–43%	***
T – C Difference	–2%	0%			
p-value (T-C)	n.s.	n.s.			n.s.
Any inpatient rehab					
Treatment	10%	5%	5%	–50%	***
Comparison	12%	6%	6%	–50%	***
T – C Difference	–2%	–1%			
p-value (T-C)	*	n.s.			n.s.
Any inpatient rehab					
Treatment	5%	3%	2%	–40%	*
Comparison	11%	6%	5%	–45%	***
T – C Difference	–6%	–3%			
p-value (T-C)	***	***			***

*** p =<0.001, † p >0.05 & < 0.10

Conclusions on Inpatient Use for Behavioral Health. The results for inpatient utilization for behavioral health conditions (SMI and SUD) are largely consistent with the results for inpatient utilization overall. When there are significant pre-period differences, they take the form of greater utilization by the Comparison group clients. Both groups experience statistically significant pre-post decreases on all metrics of utilization. When there is a statistically significant between-group difference in the size of the decreases, it takes the form of the Comparison group experiencing a greater decrease.

EMERGENCY DEPARTMENT UTILIZATION FOR BEHAVIORAL HEALTH

Severe Mental Illness. Although ED use was included in the propensity score matching model, utilization specifically for SMI was not included.

There was not a significant difference between the two groups in the percent of clients with an ED visit with an SMI diagnosis in the pre-period. However, the Comparison group experienced a slightly larger decrease in the percent of clients with such visits, and had a slightly but significantly lower percentage in the post-period than the Treatment group. Similar results were found for the average number of ED visits with an SMI diagnosis. The pre-post differences in any ED use for SMI or in the number of ED visits for SMI were not significantly different between the Treatment and Comparison clients.

Not shown are the percent of clients with claims for CPEP (Comprehensive Psychiatric Emergency Program, a hospital-based emergency psychiatric service open at all times to patients of all ages, identified by rate codes) services, which did not vary either between pre- and post- or between Treatment and Comparison (all 0.4%).

Table 12. ED Utilization for Severe Mental Illness: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	Post	Raw (post − pre)	% of pre	P-value
Any ED visits for mental health (defined by Dx)					
Treatment	15%	10%	−5%	−33%	***
Comparison	13%	8%	−5%	−38%	***
T - C Difference	2%	2%			
p-value (T-C)	n.s.	**			n.s.
Average number of ED visits for mental health (defined by Dx)					
Treatment	0.31	0.23	0.08	−26%	***
Comparison	0.23	0.15	0.08	−35%	***
T - C Difference	0.08	0.08			
p-value (T-C)	**	***			n.s.

Substance Use Disorders. Although ED use was included in the propensity score matching model, utilization specifically for SUD was not included. Nonetheless, the percent of clients with an ED visit with an SUD diagnosis during the pre-period did not vary significantly between the Treatment and Comparison group.

The pre-post difference in any ED visits for SUD was slightly but significantly greater for the Treatment group than their matched Comparison counterparts. There was a much greater decrease in ED use for SUD among the Treatment than the Comparison group (45% for the Treatment group and only 7% for the Comparison group), which was also statistically significant.

Table 13. ED Utilization for Substance Use Disorders: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	Post	Raw	% of pre	P-value
Any ED visits for substance abuse					
Treatment	15%	11%	4%	−27%	***
Comparison	14%	11%	3%	−21%	***
T - C Difference	1%	0%			
p-value (T-C)	n.s.	n.s.			*
Average number of ED visits for substance abuse					
Treatment	0.56	0.31	0.25	−45%	
Comparison	0.44	0.41	0.03	−7%	
T - C Difference	0.12	−0.10			
p-value (T-C)	n.s.	n.s.			**

Conclusions on ED Use for Behavioral Health. There were no between-group differences in ED use for an SMI, but ED use for an SUD follows a consistent pattern with ED use overall, with significantly greater decreases for the Treatment group than for the Comparison group.

HOUSING-SENSITIVE CONDITIONS

Inpatient admissions for housing sensitive conditions are not significantly different between the Treatment and Comparison groups in the pre-period. They are, however, significantly different in the post-period, with the Comparison group having less post-period inpatient use for such conditions. While inpatient use decreased 6% for the Treatment group, the decrease for the Comparison group was 49% (a significantly greater decrease).

In contrast, the Treatment group started out with significantly more ED use for housing-sensitive conditions relative to the Comparison group. Despite the fact that they continued to have significantly more of these ED visits in the post-period, they had nonetheless experienced significantly larger decrease than the Comparison group (-31% versus -25%).

Table 14. Total Number of Inpatient Admissions and Emergency Department Visits for Housing-Sensitive Conditions, Treatment vs. Comparison, Pre- and Post-Enrollment

	Inpatient					ED				
	Pre	Post	Raw	% of pre	P-value	Pre	Post	Raw	% of pre	P-value
All Housing-Sensitive Conditions										
Treatment	79	74	−5	−6%	n.s.	420	290	−130	−31%	***
Comparison	85	43	−42	−49%	***	255	191	−64	−25%	**
T - C Difference	−6	31				141	85			
p-value (T-C)	n.s.	*			*	***	***			*

*** p =<0.001, * p > 0.01 & =< 0.05, † p >0.05 & < 0.10, n.s. = not statistically significant

Conclusions on Housing-Sensitive Conditions. The Comparison clients had significantly greater reductions in inpatient use for housing-sensitive conditions, while the Treatment clients had significantly greater reductions in ED use for these conditions. This is consistent with the patterns for inpatient and ED use overall.

POTENTIALLY PREVENTABLE EMERGENCY DEPARTMENT USE

There are several different approaches to examining preventable ED use. The table below shows 11 categories of conditions identified by Excellus Health[14] as constituting a high percentage of emergency department use for non-emergency conditions.

The Treatment group had significantly more such ED visits than the Comparison group in both the pre-period and in the post-period. Both groups experienced statistically significant pre-post decreases, but the decrease for the Treatment group was significantly larger.

Table 15. Total Number of Emergency Department Visits for Routine Complaints: Treatment vs. Comparison Group, Pre- and Post-Enrollment

Excellus Conditions	Pre	Post	Raw (Post-Pre)	% of pre	Sig.
Treatment	1,634	1,019	–615	–38%	***
Comparison	964	771	–193	–20%	***
T - C Difference	670	248			
p-value (T–C)	***	***			***

*** p =<0.001, * p > 0.01 & =< 0.05, † p >0.05 & < 0.10, n.s. = not statistically significant

Another approach, used by researchers at NYU[15], aims to categorize diagnoses according to the estimated percentage of ED visits for that condition that could have been avoided either because they were non-emergent, because they could have been treated by a primary care doctor, or because they were avoidable if the patient had received adequate preventive care. The NYU team later created categories for ED visits that were potentially preventable on the basis of being related to drug or alcohol use, a mental health crisis, or an injury.

The analysis below assigns a condition to a particular category if the original research estimated it fell into that category at least 51% of the time. It is important to understand that not all of the ED visits in the "non-emergent" category, for example, were necessarily non-emergent, but were for conditions that are non-emergent more than half the time (e.g. pharyngitis, low back pain, nausea).

The Treatment group had significantly greater pre-post reductions than the Comparison group in ED visits for non-emergent conditions, emergent but primary care-treatable conditions, not primary care-treatable but avoidable conditions, and alcohol-related conditions. The difference in differences was not statistically significant for drug-related, psychiatric-related, or injury-related visits.

[14] http://brand.excellusbcbs.com/infographics/er.php

[15] http://www.ajmc.com/journals/issue/2014/2014-vol20-n4/emergency-department-visit-classification-using-the-nyu-algorithm

Table 16. Total Number of Potentially Avoidable ED Visits: Treatment vs. Comparison Group, Pre- and Post-Enrollment

NYU Conditions	Pre	Post	Raw	% of pre	Sig.
Non-emergent					
Treatment	1,662	1,072	590	–35%	***
Comparison	1,071	854	217	–20%	***
T – C Difference	591	218			
p-value (T–C)	***	**			**
Emergent, but primary care treatable					
Treatment	1,265	940	325	–26%	***
Comparison	797	630	167	–21%	**
T – C Difference	468	310			
p-value (T–C)	***	***			*
Not primary care treatable, but avoidable					
Treatment	400	264	136	–34%	***
Comparison	325	242	83	–26%	**
T – C Difference	75	22			
p-value (T–C)	*	n.s.			***
Alcohol-related					
Treatment	857	469	388	–45%	***
Comparison	638	619	19	–3%	n.s.
T – C Difference	219	–150			
p-value (T–C)	*	n.s.			***
Drug-related					
Treatment	184	91	93	–51%	***
Comparison	211	92	119	–56%	***
T – C Difference	–27	–1			
p-value (T–C)	n.s.	n.s.			n.s.
Psychiatric-related					
Treatment	779	499	280	–36%	***
Comparison	565	373	192	–34%	***
T – C Difference	214	126			
p-value (T–C)	**	**			n.s.
Injury					
Treatment	893	613	280	–31%	***
Comparison	635	465	170	–28%	***
T – C Difference	258	148			
p-value (T–C)	***	***			n.s.

*** p =<0.001, ** p > 0.001 & =< 0.01

Conclusions about Potentially Preventable ED Visits. Consistent with the earlier analyses of ED visits for an SMI or SUD diagnosis, there were not significant differences in pre-post differences between the Treatment and Comparison group for drug-related and psychiatric-related ED visits. There was, however, a very strong observed treatment effect for alcohol-related ED visits.

There was also a very consistent pattern of other types of potentially preventable ED visits being reduced significantly more in the Treatment than Comparison group. Whether it was the routine conditions identified by Excellus Health or the different categories of potentially preventable ED visits identified by NYU (non-emergent, emergent but primary care-treatable, and not primary-care treatable but avoidable), a significant treatment effect was observed. In contrast, ED visits specifically due to injuries decreased similarly between the Treatment and Comparison groups, with no significant effect.

NURSING HOME UTILIZATION

Nursing home utilization was not included in the matching process, and as a result the Comparison group had a much higher percentage of clients with any nursing home use and a larger number of pre-period nursing home days than the Treatment group. While the percent with nursing home use and total nursing home days for the Treatment group decreased significantly, however, both metrics significantly increased for the Comparison group. The difference in pre-post differences between the two groups was statistically significant for both measures.

Table 17. Total Number of Nursing Home Days: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre	Post	Raw	% of pre	Sig.
Any nursing home days					
Treatment	2.3%	0.8%	−1.5%	−65%	***
Comparison	14.4%	13.5%	−0.9%	−6%	*
T − C Difference (raw)	−12.1%	−12.7%			
p-value (T-C)	***	***			***
Total number nursing home days					
Treatment	8,493	1,177	7,316	−86%	***
Comparison	62,116	69,555	−7,439	+12%	***
T − C Difference	−53,623	−68,378			
p-value (T-C)	***	***			***

Conclusions about Nursing Home Use. While the sample should perhaps have been better matched on pre-period nursing home use, the pattern of change is very clear – Comparison group clients experience a significant increase in nursing home use, while Treatment clients experience a significant decrease. Although it was a relatively small number of Treatment clients who experienced nursing home stays, this is an extremely expensive model of care and has a disproportionate impact on Medicaid spending. These findings are consistent with the findings of the Cost 2 Volume 2 report showing that changes in nursing home spending is a major driver of Medicaid savings for the Treatment group.

RESIDENTIAL SETTINGS

Homeless Shelters. Shelter data were available for this report from the Homeless Management Information System (HMIS) in the following regions of the state: New York City, Hudson Valley, Capital District, Adirondacks, Long Island, and Central New York. However, the quality of data points used in matching was sometimes inconsistent, such that even within those regions a client with no match to the shelter data may have in fact spent time in the shelter system, due to it being listed under incorrect identifiers. In other words, clients identified with shelter stays are likely to have actually experienced shelter stays, but clients not identified with shelter stays may still have experienced shelter stays.

Furthermore, shelter data were only available through 2016, so in order to look at a full post-year of data, clients could only be included if they had enrolled in MRT-SH prior to the beginning of 2016. With these geographical and temporal limitations, the final sample size for this analysis was 1,268 matched pairs of clients.

The Treatment group clients were significantly more likely to have had any shelter use in the pre-period than the Comparison group clients, and had significantly more shelter days on average. Although both groups experienced

statistically significant decreases in both metrics, the Treatment group experienced a significantly larger decrease than the Comparison group, resulting in significantly less shelter use during the post-period.

Table 18. Documented shelter use: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=1,268 pairs)

| | Pre-Period | Y1 Post-Period | Pre-Post Diff | | P-value (pre-post) |
			Raw Diff (Post-Pre)	Diff as a % of pre	
Homeless shelter utilization					
Any shelter use					
Treatment	37%	17%	–20%	–54%	***
Comparison	27%	21%	–6%	–22%	***
T - C Difference (raw)	10%	–4%			
p-value (T–C)	***	***			***
Average number shelter days					
Treatment	85.5	8.6	–76.9	–90%	***
Comparison	38.3	33.3	–5.0	–13%	*
T - C Difference (raw)	47.2	–24.7			
p-value (T–C)	***	***			***

*** p =<0.001

State Psychiatric Facilities. Despite the high levels of SMI in the study group, there were relatively few recorded stays in state psychiatric facilities. This is because patients in these facilities are not covered by Medicaid, and so any stay of longer than 60 days would have resulted in clients being removed from our sample due to the continuous coverage criteria described in the Methodology section.

The Treatment group were significantly less likely than the Comparison group to have any such stays in the pre-period, and also had significantly fewer days in this setting. While the Comparison group experienced statistically significant pre-post decreases in this type of residence, the Treatment group did not. The difference in pre-post differences between the two groups was not statistically significant on either measure.

Table 19. Stays in State Psychiatric Facilities: Treatment vs. Comparison Group, Pre- and Post-Enrollment

| | Pre-Period | Y1 Post-Period | Pre-Post Diff | | P-value (pre-post) |
			Raw Diff (Post-Pre)	Diff as a % of pre	
Any state psychiatric inpatient					
Treatment	1.4%	0.9%	–0.5%	–36%	n.s.
Comparison	2.8%	1.3%	–1.5%	–54%	***
T - C Difference (raw)	–1.4%	–0.4%			
p-value (T–C)	**	n.s.			n.s.
Average number days in state psychiatric inpatient					
Treatment	1.2	0.6	–0.6	–50%	n.s.
Comparison	3.1	2.6	–0.5	–16%	*
T - C Difference (raw)	–1.9	–2.0			
p-value (T–C)	**	**			n.s.

State Mental Health (OMH) Residential Settings. Clients in the Treatment group were significantly more likely to have an OMH residential placement in the pre-period than their counterparts in the Comparison group, and also had significantly more days in these settings. But while the percentage of clients spending time in such a setting decreased significantly for the Treatment clients, it increased significantly for the Comparison clients. The same was true of number of days in these residential settings. The difference in pre-post changes between the two groups was statistically significant. In the post-period, Treatment clients had significantly less utilization of these residential settings than Comparison clients.

Table 20. Stays in OMH Residential Settings: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre-Period	Y1 Post-Period	Pre-Post Diff		P-value (pre-post)
			Raw Diff (Post-Pre)	Diff as a % of pre	
OMH residential utilization					
Any OMH residential placement					
Treatment	12%	5%	–7%	–58%	***
Comparison	6%	7%	1%	17%	**
T - C Difference (raw)	6%	–2%			
p-value (T–C)	***	**			***
Average number days OMH residential placement					
Treatment	33.6	8.2	–25.4	–76%	***
Comparison	14.1	19.6	5.5	39%	***
T - C Difference (raw)	19.5	–11.4			
p-value (T–C)	***	***			***

Conclusions about Changes in Residential Settings. There were significantly greater pre-post decreases in shelter use and OMH residential placements for the Treatment group than the Comparison group. This was expected, as MRT-SH replaces these settings. Still, MRT-SH clients who leave the program are at risk of returning to these settings, so it is worthwhile to confirm that the expected reduction did in fact take place. Furthermore, while these settings are not paid for by Medicaid, these are relatively expensive models of care for the system as a whole, with likely a lower quality of life for the clients in those settings.

MORTALITY

Mortality is a complex construct to measure. It cannot be approached by measuring pre-post changes, as clients can only die once, and the continuous coverage criteria mean that all clients must have at least survived for ten months after their post-period start date (as deceased clients will no longer have Medicaid coverage). The amount of time clients are "at risk" of dying also varies depending on their start date (although the fixed matching of clients by start date means that time at risk is the same for both groups overall and for both clients in a pair, although it may differ between pairs).

The most appropriate approach to analyzing mortality differentials would be an in-depth survival analysis. A comprehensive survival analysis is beyond the scope of this report, but a simple between-group comparison of mortality since the end of each client's post-period provides an important starting point for potentially more extensive analyses, as well as information about a key health outcome.

By March 2020, 8% of the Treatment clients and 15% of the Comparison clients were reported as being deceased. Given that the two groups were well-balanced on age, comorbidities, and Medicaid spending, this result is very striking. A McNemar test indicated a p-value <0.001.

Clients in the Treatment group who died also did so slightly later (i.e. survived longer) than their counterparts in the Comparison group, but this result was not statistically significant.

Table 21. Mortality and Time to Mortality: Treatment vs. Comparison Group

	Pct. Deceased	Avg. months from pre-period start to death	Median months from pre-period start to death
Treatment	8%	46.7	45
Comparison	15%	46.1	43
	***	n.s.	n.s.

The table below shows what percentage of those "at risk" during each time period died in each year since the end of their post-period. (Clients not "at risk" of death during a time period would include those who had already died in an earlier time period or those for whom the stated time period ended after the data pull in March 2020 - for example, if a client's post-period ended in July 2017, their 3rd year after post-period would not end until July 2020, so we do not yet know if they will die during their 3rd post-period year.) Pairs were only included in the analysis for each year if both matched clients were still at risk.

Although the Treatment group has lower mortality than the Comparison group in all periods, the difference was only statistically significant in the first three years following the post-period year[16]. The inability to detect a statistically significant effect in the fourth year may be due to a smaller sample size; however the effect still trended in the direction of higher mortality among the Comparison group.

Table 22. Mortality by Years after Post-Period, Treatment vs. Comparison Group

	Treatment	Comparison	p-value
1st year after post-period (n=2,037 pairs)	2.7%	4.7%	***
2nd year after post-period (n=1,895 pairs)	1.8%	4.7%	***
3rd year after post-period (n=1,307 pairs)	1.5%	3.4%	**
4th year after post-period (n=895 pairs)	1.9%	3.4%	n.s.

Conclusions about Mortality. Reductions in mortality make a compelling case for the value of MRT-SH programs to the well-being of high-risk Medicaid clients. While this measure deserves a more sophisticated analysis as part of future research, the simple descriptive statistics presented here make a strong case that Treatment clients in MRT-SH programs experience lower levels of mortality than a matched Comparison group, and that this effect persists for several years after MRT-SH enrollment.

[16] The p-value for the 4th year after the post-period was 0.08.

Directions for Future Research

As noted in the Methodology section, comparisons between subsets of Treatment and Comparison clients cannot be considered as reliable as comparisons between the full groups, as the propensity score matching model used was not based on subgroups. Specifically, while diagnosis and prior housing status were included in the model as covariates, and thus part of the creation of the propensity score, matching on these factors was not a requirement during Comparison participant selection. As such, while the subgroup of participants with each diagnosis or prior housing situation can be identified, and outcomes compared under the same procedures, the subgroups may not be well-matched on pre-period outcomes or on any other modeled factor (e.g., demographics, histories, clinical background, etc.).

However, provided certain conditions are met, these subset analyses can be performed in a more exploratory manner; the patterns found may direct future research in useful directions and point to more specific models based around these factors. As such, the feasibility of subset analyses based on each diagnosis and prior housing status was first examined. The number of Treatment and Comparison clients meeting analysis criteria was examined; at least 25 matched pairs of clients in each group were required. There were too few pairs with HIV or either type of OMH residential history to examine.

The outcomes that have been most heavily studied throughout the MRT-SH evaluation have been inpatient and ED use. These are the two metrics that will receive preliminary investigation in this section.

DIFFERENCE IN OUTCOMES FOR PARTICIPANTS BY DIAGNOSIS

Pre-post differences in inpatient days and ED visits were compared between the two groups for clients in each diagnostic category.

Serious Mental Illness
Inpatient Stays. The use of any inpatient care among matched pairs in which both clients had an SMI was similar to the use of any inpatient care among the Treatment and Comparison groups overall. Both the Treatment and Comparison clients with SMI had statistically significant pre-post decreases in inpatient use. The Comparison clients had significantly higher levels of inpatient use in the pre-period, but experienced a larger decrease so that there was no difference in the post-period.

Both Treatment and Comparison clients from the matched pairs with SMI had a somewhat higher number of average inpatient days than their counterparts overall. However, the pattern was the same: the Comparison group clients started out with a significantly higher number of inpatient days relative to the Treatment group, and both groups experienced statistically significant pre-post decreases in the number of days such that significant Treatment-Comparison differences remained in the post-period.

The difference in differences for any inpatient days is statistically significant, with Comparison group clients experiencing a larger decrease than Treatment group clients. The difference in differences for number of inpatient days is also statistically significant, with the Comparison group clients experiencing a larger raw decrease in inpatient days than their counterparts.

Table 23. Overall Inpatient Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=1,320 pairs)

	Pre-Period	Y1 Post-Period	Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
Inpatient utilization					
Any inpatient care					
Treatment	53%	38%	–15%	–28%	***
Comparison	62%	39%	–23%	–37%	***
T - C Difference (raw)	–9%	–1%			
p-value (T-C)	***	n.s.			***
Average number inpatient days					
Treatment	13.6	7.2	–6.4	–47%	***
Comparison	17.8	9.5	–8.3	–47%	***
T - C Difference (raw)	–4.2	–2.3			
p-value (T-C)	***	*			***

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

Emergency Department Visits. Both the Treatment and Comparison clients from the matched pairs with SMI were somewhat more likely to have ED use than their counterparts overall. The patterns, however, were much the same. The two groups did not have statistically significant pre-period differences in the percent with any ED use, but both had statistically significant decreases in the post-period, with the decrease slightly but significantly larger for the Comparison group clients.

For average number of ED visits, however, the Treatment group had significantly higher pre-period values than the Comparison group. Both groups experienced statistically significant pre-post decreases, but the decrease for the Treatment group was significantly larger, so that there was not a significant difference between groups in the post-period number of visits.

Table 24. Overall ED Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre-Period	Y1 Post-Period	Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
Emergency department utilization					
Any ED visits					
Treatment	73%	62%	–11%	–15%	***
Comparison	72%	58%	–14%	–19%	***
T - C Difference (raw)	1%	4%			
p-value (T-C)	n.s.	*			*
Average number of ED visits					
Treatment	4.2	2.8	–1.4	–33%	***
Comparison	3.3	2.7	–0.6	–18%	***
T - C Difference (raw)	0.9	0.1			
p-value (T-C)	***	n.s.			***

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

Substance Use Disorder

Inpatient Stays. Both Treatment and Comparison clients from matched pairs with an SUD were more likely than their counterparts overall to have some inpatient utilization in the pre-period. The Comparison group clients from the matched pairs with an SUD were significantly more likely to have inpatient utilization in the pre-period than the Treatment clients. Both groups experienced statistically significant pre-post decreases, but the decrease was significantly larger for the Comparison group clients, such that both groups had identical post-period rates of inpatient use.

The same general pattern was found for number of inpatient days. Although both groups had statistically significant pre-post decreases, the Comparison group started higher and decreased significantly more, leaving no statistically significant post-period difference.

Table 25. Overall Inpatient Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=648 pairs)

	Pre-Period	Y1 Post-Period	Pre-Post Diff		P-value (pre-post)
			Raw Diff (Post-Pre)	Diff as a % of pre	
Inpatient utilization					
Any inpatient care					
Treatment	64%	45%	–19%	–30%	***
Comparison	75%	45%	–30%	–40%	***
T - C Difference (raw)	–11%	0%			
p-value (T–C)	***	n.s.			***
Average number inpatient days					
Treatment	15.7	9.2	–6.5	–41%	***
Comparison	22.7	11.7	–11.0	–48%	***
T - C Difference (raw)	–7.0	–2.5			
p-value (T–C)	***	n.s.			***

*** p =<0.001, ******p>0.001 & p=<0.01, n.s. = not statistically significant

Emergency Department Visits. The Treatment and Comparison groups did not significantly differ among those matched pairs with an SUD in either the pre-period or the post-period, but both groups experienced statistically significant pre-post reductions in the percentage with ED use. The decrease was slightly but not significantly larger for the Comparison group.

The Treatment clients started out with a significantly higher volume of ED visits relative to the Comparison clients, but they also experienced a significantly larger pre-post decrease, so that the two groups were not statistically significant in the post-period.

Table 26. Overall ED Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre-Period	Y1 Post-Period	Pre-Post Diff		P-value (pre-post)
			Raw Diff (Post-Pre)	Diff as a % of pre	
Emergency department utilization					
Any ED visits					
Treatment	82%	68%	–14%	–17%	***
Comparison	83%	67%	–16%	–19%	***
T - C Difference (raw)	–1%	1%			
p-value (T-C)	n.s.	n.s.			n.s.
Average number of ED visits					
Treatment	5.2	3.2	–2.0	–38%	***
Comparison	4.1	3.5	–0.6	–15%	***
T - C Difference (raw)	1.1	–0.3			
p-value (T-C)	***	n.s.			***

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

Other Chronic Medical Conditions

Inpatient Stays. The Comparison group clients in the matched pairs with chronic medical conditions had significantly higher pre-period rates of inpatient use than the Treatment clients. Both groups experienced a statistically significant pre-post decrease in inpatient use, but the decrease was significantly larger for the Comparison group, such that the two groups were not significantly different in the post-period. The same pattern was found for number of inpatient days, where the Comparison group also experienced a significantly larger decrease.

Table 27. Overall Inpatient Utilization Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=557 pairs)

	Pre-Period	Y1 Post-Period	Pre-Post Diff Raw Diff (Post-Pre)	Pre-Post Diff Diff as a % of pre	P-value (pre-post)
Inpatient utilization					
Any inpatient care					
Treatment	51%	43%	–8%	–16%	***
Comparison	64%	38%	–26%	–40%	***
T - C Difference (raw)	–13%	5%			
p-value (T–C)	***	n.s.			***
Average number inpatient days					
Treatment	13.4	7.6	–5.8	–43%	***
Comparison	16.7	7.0	–9.7	–58%	***
T - C Difference (raw)	–3.3	–0.6			
p-value (T–C)	***	n.s.			***

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

Emergency Department Visits. The percent with any ED use did not vary in the pre-period between the Treatment and Comparison clients in the matched pairs with chronic medical conditions. Both groups experienced statistically significant pre-post decreases, but the Comparison group experienced a significantly larger decrease, so that in the post-period the Comparison clients had significantly lower rates of ED use.

The average number of ED visits was significantly higher for the Treatment than for the Comparison group in the pre-period, and both groups experienced statistically significant decreases between the pre- and post-periods. The Treatment group had a larger decrease than the Comparison group, but not significantly larger, and still had significantly higher levels of post-period ED visits.

The difference in differences for any ED visit was statistically significant when using the McNemar-Bowker test (p=0.008).

Table 28. Overall ED Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment

	Pre-Period	Y1 Post-Period	Pre-Post Diff Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
Emergency department utilization					
Any ED visits					
Treatment	70%	61%	–9%	–13%	***
Comparison	70%	52%	–18%	–26%	***
T - C Difference (raw)	0%	–9%			
p-value (T-C)	n.s.	**			**
Average number of ED visits					
Treatment	4.8	3.3	–1.5	–31%	***
Comparison	3.1	2.4	–0.7	–23%	***
T - C Difference (raw)	1.7	0.9			
p-value (T-C)	***	***			n.s.

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

Three or More Types of Conditions

Inpatient Stays. Among the matched client pairs with three of more types of conditions, the Comparison group had significantly higher rates of inpatient use and number of inpatient days in the pre-period, compared to the Treatment group. Both groups experienced statistically significant pre-post decreases in both metrics, but the decreases were significantly larger for the Comparison group, resulting in no significant post-period differences.

Table 29. Overall Inpatient Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=134 pairs)

	Pre-Period	Y1 Post-Period	Pre-Post Diff		
			Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
Inpatient utilization					
Any inpatient care					
Treatment	69%	54%	–15%	–22%	**
Comparison	81%	46%	–35%	–43%	***
T - C Difference (raw)	–12%	8%			
p-value (T-C)	*	n.s.			**
Average number inpatient days					
Treatment	21.8	13.8	–8.0	–37%	**
Comparison	25.2	11.0	–14.2	–56%	***
T - C Difference (raw)	–3.4	2.8			
p-value (T-C)	*	n.s.			*

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

Emergency Department Visits. There were not significant pre-period differences in ED use between the Treatment and Comparison groups, and both groups experienced significant pre-post decreases of a similar magnitude, such that there were no significant post-period differences either.

The Treatment group had significantly more ED visits than the Comparison group in the pre-period. Both groups had statistically significant pre-post decreases, but the decrease was larger for the Treatment group, such that there was no significant difference in the post-period.

There was not a significantly different pre-post decrease between groups for either metric.

Table 30. Overall ED Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=134 pairs)

	Pre-Period	Y1 Post-Period	Pre-Post Diff		P-value (pre-post)
			Raw Diff (Post-Pre)	Diff as a % of pre	
Emergency department utilization					
Any ED visits					
Treatment	87%	73%	−14%	−16%	***
Comparison	88%	72%	−16%	−18%	**
T - C Difference (raw)	−1%	1%			
p-value (T–C)	n.s.	n.s.			n.s.
Average number of ED visits					
Treatment	7.6	5.7	−1.9	−25%	***
Comparison	5.1	4.2	−0.9	−18%	**
T - C Difference (raw)	2.5	1.5			
p-value (T–C)	*	n.s.			n.s.

*** p =<0.001, **p>0.001 & p=<0.01, n.s. = not statistically significant

DIFFERENCE IN OUTCOMES FOR PARTICIPANTS BY HOUSING HISTORY

Pre-post differences in inpatient days and ED visits were compared between the two groups for clients with a pre-period homeless shelter history.

Shelter Users

Inpatient Stays. Within those matched pairs with pre-period shelter use, the Comparison group clients had significantly higher rates of pre-period inpatient use. Both groups experienced statistically significant pre-post decreases, and the Comparison group continued to have significantly more inpatient use in the post-period. The difference in differences was not statistically significant.

The Comparison group also had significantly more pre-period inpatient days than the Treatment group, and both groups experienced significant pre-post decreases. The decrease was significantly larger for the Comparison group, however, such that there was not a statistically significant difference in the post-period.

Table 31. Overall Inpatient Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=149 pairs)

| | Pre-Period | Y1 Post-Period | Pre-Post Diff | | |
			Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
Inpatient utilization					
Any inpatient care					
Treatment	50%	36%	–14%	–28%	**
Comparison	72%	48%	–24%	–33%	***
T – C Difference (raw)	–22%	–12%			
p-value (T–C)	***	*			n.s.
Average number inpatient days					
Treatment	10.6	7.8	–2.8	–26%	**
Comparison	15.7	7.9	–7.8	–50%	***
T – C Difference (raw)	–5.1	–0.1			
p-value (T–C)	***	n.s.			*

Emergency Department Visits. There was no difference between the two groups in pre-period ED use. Both groups experienced significant decreases, and the size of these decreases did not significantly vary between groups. Thus, there was not a statistically significant difference between groups in the post-period.

There were no statistically significant differences in number of ED visits between the Treatment and Comparison groups in the pre-period. Both groups experienced significant pre-post decreases, and these decreases were larger for the Treatment group (but not significantly so). The post-period numbers were not statistically significant between the groups.

Table 32. Overall Inpatient Utilization: Treatment vs. Comparison Group, Pre- and Post-Enrollment (n=149 pairs)

	Pre-Period	Y1 Post-Period	Raw Diff (Post-Pre)	Diff as a % of pre	P-value (pre-post)
			Pre-Post Diff		
Emergency department utilization					
Any ED visits					
Treatment	83%	65%	–18%	–22%	***
Comparison	83%	66%	–17%	–20%	***
T - C Difference (raw)	0%	–1%			
p-value (T-C)	n.s.	n.s.			n.s.
Average number of ED visits					
Treatment	4.2	2.6	–1.6	–38%	***
Comparison	5.9	5.3	–0.6	–10%	**
T - C Difference (raw)	–1.7	–2.7			
p-value (T-C)	n.s.	n.s.			n.s.

Conclusions

MRT-SH appears to have a robust effect on number of ED visits, both overall and for various types of conditions. This seems to be particularly true of different kinds of potentially preventable ED visits. While ED visits are not one of the major drivers of costs for this population, as established in the Cost 2 report, this is a promising indication of improvements in client well-being as a result of MRT-SH.

MRT-SH programs also show promise in keeping clients out of high-cost residential settings. Significant treatment effects were observed for reductions in the use of nursing homes, homeless shelters, and OMH residential settings. Not only are these settings expensive, but likely less conducive to client psychological well-being.

Finally, the MRT-SH program is associated with fewer client deaths after the post-period. (Clients who died during the post-period would have been excluded from the study sample.) This effect appeared to persist for up to four years after MRT-SH enrollment (i.e. up to three years after the post-period end).

These promising findings are balanced against the consistent finding that the Comparison group clients have greater reductions in inpatient use than the Treatment clients. This unexpected result was statistically significant for many types of inpatient use, and for all the subgroups examined. It is not clear why this would be the case, but is possible that it is related to the matching procedure, which was optimized for matching on cost and may have resulted in artificially greater imbalance on pre-period inpatient use as a result.

Despite the unexpected results for inpatient use, however, the MRT-SH program shows promise in improving several aspects of client well-being, even compared to a matched Comparison group of similar clients.

**Medicaid Redesign Team
Supportive Housing Evaluation**

Outcomes Report 2

Volume 2: Pre-Post Analysis

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